

COMMONWEALTH OF KENTUCKY  
NATURAL RESOURCES & ENVIRONMENTAL PROTECTION CABINET  
DEPARTMENT FOR ENVIRONMENTAL PROTECTION  
DIVISION OF WATER

APPLICATION FOR PERMIT TO CONSTRUCT ACROSS OR ALONG A STREAM  
AND / OR WATER QUALITY CERTIFICATION

Chapter 151 of the Kentucky Revised Statutes requires approval from the Division of Water prior to any construction or other activity in or along a stream that could in any way obstruct flood flows or adversely impact water quality. If the project involves work in a stream, such as bank stabilization, dredging or relocation, you will also need to obtain a 401 Water Quality Certification (WQC) from the Division of Water. This completed form will be forwarded to the Water Quality Branch for WQC processing. The project may not start until all necessary approvals are received from the KDOW. For questions concerning the WQC process, contact the WQC section at 502/564-3410.

If the project will disturb more than 1 acre of soil, you will also need to complete the attached Notice of Intent for Storm Water Discharges, and return both forms to the Floodplain management Section of the KDOW. This general permit will require you to create and implement an erosion control plan for the project.

1. OWNER:       Kentucky Transportation Cabinet      

MAILING ADDRESS:       200 Mero Street Frankfort, KY 40622      

TELEPHONE #:       502-564-7250       EMAIL:       ronb.rignevii@ky.gov      

2. AGENT:       Ronald B. Rigney, II      

ADDRESS:       200 Mero Street Frankfort, KY 40622      

TELEPHONE #:       502-654-7250       EMAIL:       ronb.rignevii@ky.gov      

3. ENGINEER:       N/A       P.E. NUMBER:       N/A      

4. DESCRIPTION OF CONSTRUCTION:       Reconstruction of a priority section of KY 32 between the end of the Corps of Engineers reconstruction at Yatesville Lake and US 23 in Lawrence County, KY.      

5. COUNTY:       Lawrence       NEAREST COMMUNITY:       Louisa      

6. USGS QUAD NAME       Adams       LATITUDE/LONGITUDE:       38.104866 / -82.627751      

7. STREAM NAME:       Harriet Branch, Whetstone Branch, Greenbriar Creek, Smoky Valley Fork, Burgess Branch, and their UTs       WATERSHED SIZE (in acres):       > 250 acres      

8. LINEAR FEET OF STREAM IMPACTED:       1,673 LF perennial / 5,155 LF intermittent      

9. DIRECTIONS TO SITE:       I-64 to exit #191, US 23 south to KY 32      

10. IS ANY PORTION OF THE REQUESTED PROJECT NOW COMPLETE? Yes ☐ No ☒ If yes, identify the completed portion on the drawings you submit and indicate the date activity was completed. DATE:                     

11. ESTIMATED BEGIN CONSTRUCTION DATE:       September 2011      

12. ESTIMATED END CONSTRUCTION DATE:       September 2013      

13. HAS A PERMIT BEEN RECEIVED FROM THE US ARMY, CORPS of ENGINEERS? Yes ☐ No ☒ If yes, attach a copy of that permit.

14. THE APPLICANT **MUST** ADDRESS PUBLIC NOTICE:

(a) PUBLIC NOTICE HAS BEEN GIVEN FOR THIS PROPOSAL BY THE FOLLOWING MEANS:

- ☐ Public notice in newspaper having greatest circulation in area (provide newspaper clipping or affidavit)  
☐ Adjacent property owner(s) affidavits (Contact Division of Water for requirements.)

(b) ☐ I REQUEST WAIVER OF PUBLIC NOTICE BECAUSE:

\_\_\_\_\_  
Contact Division of Water for requirements.

15. I HAVE CONTACTED THE FOLLOWING CITY OR COUNTY OFFICIALS CONCERNING THIS PROJECT:

\_\_\_\_\_  
Give name and title of person(s) contacted and provide copy of any approval city or county may have issued.

16. LIST OF ATTACHMENTS: ☐ Attached is a complete 401 application including a HUC 14 analysis.

\_\_\_\_\_  
List plans, profiles, or other drawings and data submitted. Attach a copy of a 7.5 minute USGS topographic map clearly showing the project location.

17. I, \_\_\_\_\_ (owner) CERTIFY THAT THE OWNER OWNS OR HAS EASEMENT RIGHTS ON ALL PROPERTY ON WHICH THIS PROJECT WILL BE LOCATED OR ON WHICH RELATED CONSTRUCTION WILL OCCUR (for dams, this includes the area that would be impounded during the design flood).

18. REMARKS: \_\_\_\_\_

I hereby request approval for construction across or along a stream as described in this application and any accompanying documents. To the best of my knowledge, all the information provided is true and correct.

SIGNATURE: Ronald B. Kinye Jr  
Owner or Agent sign here. (If signed by Agent, a Power of Attorney should be attached.)

DATE: 11-5-2009

SIGNATURE OF LOCAL FLOODPLAIN COORDINATOR:

\_\_\_\_\_  
Permit application will be returned to applicant if not properly endorsed by the local floodplain coordinator.

DATE: \_\_\_\_\_

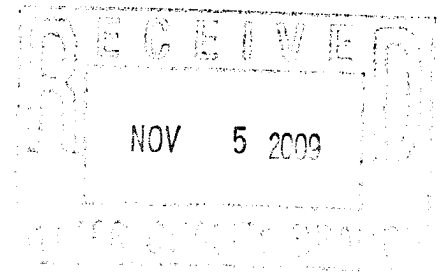
SUBMIT APPLICATION AND ATTACHMENTS TO:

Floodplain Management Section  
Division of Water  
14 Reilly Road

**ATTACHMENT**

**PRELIMINARY JURISDICTIONAL DETERMINATION FORM**

**BACKGROUND INFORMATION**



**A. REPORT COMPLETION DATE FOR PRELIMINARY JURISDICTIONAL DETERMINATION (JD):**

**B. NAME AND ADDRESS OF PERSON REQUESTING PRELIMINARY JD:** Kentucky Transportation Cabinet, 200 Mero Street, Frankfort, KY 40622; c/o Dave Harmon

**C. DISTRICT OFFICE, FILE NAME, AND NUMBER:**

**D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:  
(USE THE ATTACHED TABLE TO DOCUMENT MULTIPLE WATERBODIES AT DIFFERENT SITES)**

State: Kentucky County/parish/borough: Lawrence City: Louisa (nearest)  
Center coordinates of site (lat/long in degree decimal format): Lat. 38.088945° N,  
Long. 82.650524° W.

Universal Transverse Mercator: 17 4216970 355259

Name of nearest waterbody: Harriet Br., Greenbrier Creek, and Smokey Valley Fork

Identify (estimate) amount of waters in the review area:

Non-wetland waters: 8,661 linear feet: width (ft) and/or 0.807 (ponds) acres.

Cowardin Class: N/A

Stream Flow: Perennial=1,673', Intermittent=5,155', Ephemeral=1,833'

Wetlands: 0.985 acres.

Cowardin Class: PSS1B, PSS1C, PEM1B, PEM1C

Name of any water bodies on the site that have been identified as Section 10 waters:

Tidal: N/A

Non-Tidal: N/A

**E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):**

☐ Office (Desk) Determination. Date:

☒ Field Determination. Date(s):

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction

notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable. This preliminary JD finds that there "may be" waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

**SUPPORTING DATA. Data reviewed for preliminary JD (check all that apply - checked**

items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps:
- ☒ Corps navigable waters' study: Section 10 waters list provided by COE.
- ☒ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☒ USGS 8 and 12 digit HUC maps.
- ☒ U.S. Geological Survey map(s). Cite scale & quad name: 1:24000, Adams, KY (1993).
- ☒ USDA Natural Resources Conservation Service Soil Survey. Citation: Lawrence, (1995).

- ☒ National wetlands inventory map(s). Cite name: Adams, KY NWI (1992).  
☐ State/Local wetland inventory map(s): .  
☒ FEMA/FIRM maps: Lawrence Co. FIRM, dated 6/18/90.  
☐ 100-year Floodplain Elevation is:  
☒ Photographs: ☐ Aerial (Name & Date): .  
or ☒ Other (Name & Date): Taken during assessments.  
☐ Previous determination(s). File no. and date of response letter: .  
☐ Other information (please specify): .

**IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.**

\_\_\_\_\_  
Signature and date of  
Regulatory Project Manager  
(REQUIRED)

Ronald B. Rigney  
Signature and date of  
person requesting preliminary JD  
(REQUIRED, unless obtaining the signature is  
impracticable)

**Lawrence County, Item No. 12-284.00**

| <b>Stream ID No.</b> | <b>Latitude</b> | <b>Longitude</b> | <b>Flow Regime/<br/>Cowardin Class</b> | <b>Estimated amount of resource in review area</b> | <b>Class of aquatic resource</b> |
|----------------------|-----------------|------------------|--|--|----------------------------------|
|                      |                 |                  |  |  |                                  |
| PER-1                | 38.068889       | 82.670000        | Perennial                              | 868 linear feet                                    | non-section 10 – non-wetland     |
| PER-2                | 38.086111       | 82.655278        | Perennial                              | 622 linear feet                                    | non-section 10 – non-wetland     |
| PER-3                | 38.095833       | 82.639444        | Perennial                              | 183 linear feet                                    | non-section 10 – non-wetland     |
| INT-1                | 38.069167       | 82.669167        | Intermittent                           | 28 linear feet                                     | non-section 10 – non-wetland     |
| INT-2                | 38.070278       | 82.664444        | Intermittent                           | 106 linear feet                                    | non-section 10 – non-wetland     |
| INT-3                | 38.073889       | 82.662500        | Intermittent                           | 90 linear feet                                     | non-section 10 – non-wetland     |
| INT-4                | 38.077778       | 82.658333        | Intermittent                           | 111 linear feet                                    | non-section 10 – non-wetland     |
| INT-5                | 38.081111       | 82.656111        | Intermittent                           | 190 linear feet                                    | non-section 10 – non-wetland     |
| INT-6                | 38.084167       | 82.655833        | Intermittent                           | 145 linear feet                                    | non-section 10 – non-wetland     |
| INT-7                | 38.087778       | 82.651389        | Intermittent                           | 898 linear feet                                    | non-section 10 – non-wetland     |
| INT-8                | 38.086111       | 82.653611        | Intermittent                           | 72 linear feet                                     | non-section 10 – non-wetland     |
| INT-9                | 38.088333       | 82.651389        | Intermittent                           | 168 linear feet                                    | non-section 10 – non-wetland     |
| INT-10               | 38.093611       | 82.645000        | Intermittent                           | 793 linear feet                                    | non-section 10 – non-wetland     |
| INT-11               | 38.093889       | 82.642500        | Intermittent                           | 445 linear feet                                    | non-section 10 – non-wetland     |
| INT-12               | 38.095556       | 82.639722        | Intermittent                           | 1004 linear feet                                   | non-section 10 – non-wetland     |
| INT-13               | 38.093056       | 82.638611        | Intermittent                           | 31 linear feet                                     | non-section 10 – non-wetland     |
| INT-14               | 38.096111       | 82.638611        | Intermittent                           | 525 linear feet                                    | non-section 10 – non-wetland     |
| INT-15               | 38.101389       | 82.637500        | Intermittent                           | 143 linear feet                                    | non-section 10 – non-wetland     |

|        |           |           |              |                 |                              |
|--------|-----------|-----------|--------------|-----------------|------------------------------|
| INT-16 | 38.104444 | 82.637500 | Intermittent | 80 linear feet  | non-section 10 – non-wetland |
| INT-17 | 38.105556 | 82.625833 | Intermittent | 114 linear feet | non-section 10 – non-wetland |
| INT-18 | 38.106389 | 82.626111 | Intermittent | 212 linear feet | non-section 10 – non-wetland |
| EPH-1  | 38.069920 | 82.666941 | Ephemeral    | 130 linear feet | non-section 10 – non-wetland |
| EPH-2  | 38.069402 | 82.665989 | Ephemeral    | 107 linear feet | non-section 10 – non-wetland |
| EPH-3  | 38.078685 | 82.658515 | Ephemeral    | 146 linear feet | non-section 10 – non-wetland |
| EPH-4  | 38.096193 | 82.647812 | Ephemeral    | 188 linear feet | non-section 10 – non-wetland |
| EPH-5  | 38.095005 | 82.642448 | Ephemeral    | 393 linear feet | non-section 10 – non-wetland |
| EPH-6  | 38.093734 | 82.640905 | Ephemeral    | 572 linear feet | non-section 10 – non-wetland |
| EPH-7  | 38.094441 | 82.638539 | Ephemeral    | 26 linear feet  | non-section 10 – non-wetland |
| EPH-8  | 38.096714 | 82.638365 | Ephemeral    | 271 linear feet | non-section 10 – non-wetland |
|        |           |           |              |                 |                              |
| Wet. A | 38.069675 | 82.670533 | PSS1C        | 0.178 acres     | non-section 10 – wetland     |
| Wet. B | 38.104464 | 82.637025 | PEM1B        | 0.184 acres     | non-section 10 – wetland     |
| Wet. C | 38.076667 | 82.659167 | PSS1B        | 0.362 acres     | non-section 10 – wetland     |
| Pond 1 | 38.070294 | 82.667159 | Open water   | 0.315 acres     | non-10 - non-wet.            |
| Wet. D |           |           | PEM1B        | 0.011 acres     | non-10 - wetland             |
| Pond 2 | 38.095111 | 82.647623 | Open water   | 0.388 acres     | non-10 - non-wet.            |
| Wet. E |           |           | PEM1C        | 0.024 acres     | non-10 - wetland             |
| Pond 3 | 38.095974 | 82.647665 | Open water   | 0.055           | non-10 - non-wet.            |
| Wet. F |           |           | PEM1C        | 0.226           | non-10 - wetland             |
| Pond 4 | 38.095602 | 82.642891 | Open water   | 0.049           | non-section 10 – non-wetland |
|        |           |           |              |                 |                              |



ATTACHMENT  
Block 24

**Adjoining Property Owners**

Millard Roberts  
618 North Lock Ave.  
Louisa, KY 41230

James & Carla Marcum  
Box 178  
764 Cottonwood Road  
Louisa, KY 41230

Patricia & Jennie Mae Holt  
4505 Hwy. 32  
Louisa, KY 41230

Pamela & Ralph Vaughn  
1021 Woodman Drive  
Worthington, OH 43085

Elmon & Roberta Pigg  
4208 Hwy. 32  
Louisa, KY 41230

Arlen Burton  
4207 Hwy. 32  
Louisa, KY 41230

Gale & Anna Fyffe  
129 Fyffe Farm Road  
Louisa, KY 41230

Charles Bond  
191 Hawk Road  
Louisa, KY 41230

Margaret Tevis  
P.O. Box 536  
Wheelersburg, OH 45694

Robert & Diane Martin  
2173 Hwy. 32  
Louisa, KY 41230

Corps of Engineers, c/o Lea Bodmer  
502 Eighth Street  
Huntington, WV 25701

Corlis Barnette  
3071 Hwy. 32  
Louisa, KY 41230

Karen Kennedy  
2332 Old Hickory Lane  
Lexington, KY 40515

Pearl, Truman, & Barbara Greer  
2817 Hwy. 32  
Louisa, KY 41230

Bryan & Angie Skaggs  
2553 Hwy. 32  
Louisa, KY 41230

Robert & Carrie Hughes  
2261 Hwy. 32  
Louisa, KY 41230

Jim Cyrus  
1900 Hwy. 32  
Louisa, KY 41230

John & Carla Hay  
3412 Alpine Court  
Lexington, KY 40517

James Muncy  
2045 Johnstown Road  
Huntington, WV 25701

Robert & Deborah Smith  
245 Pine Ridge Road  
Louisa, KY 41230

Paul & Nancy Alley  
1953 Hwy. 32  
Louisa, KY 41230

Wesley & Audra Kingsmore  
48 Hidden Lane  
Louisa, KY 41230

Shannon & Betty Compton  
311 Greenbriar Road  
Louisa, KY 41230

Willard Roberts  
2435 Ontario Street  
Flatwoods, KY 41139

## SUMMARY OF IMPACTS

### Item No. 12-284.00

(All stations are mainline unless otherwise noted)

1. Left Sta. 19+20 to 21+60 - Fill **0.012 acres of wetland** (Wetland A), which drains to a tributary of Harriet Branch. The drainage area affected is **1 acre**. The site is located near N38-04-10, W82-40-13. (Nationwide Permit No. 14)
2. Right Sta. 20+00 to Left Sta. 27+20 – Construct 108' of box culvert (Sta. 22+53.33), with 221' of outlet and 393' of inlet channel; on Harriet Branch. This replaces **760' of perennial stream (PER-1DS)**, and **28' of intermittent stream (INT-1)** with **28' of existing culvert**. The impact to waters is **0.211 acres (0.209 ac. of perennial and 0.002 ac. of intermittent)**. The drainage area affected is **538 acres**. The site is located (centrally) near N38-04-08, W82-40-12. (Individual Permit, WQC)
3. Sta. 29+00 – Construct 32' of box culvert, with 26' of inlet and 27' of outlet channel; on Harriet Branch. This replaces **87' of perennial stream (PER-1US)**. The impact to waters is **0.014 acres**. The drainage area affected is **467 acres**. The site is located near N38-04-09, W82-40-06. (Nationwide Permit No. 14, WQC)
4. Left Sta. 32+00 – Construct Excess Fill Site #13, on a pond with a tributary to Harriet Branch. This replaces a **0.315 acre pond (Pond #1)**, **0.011 acres of wetlands (Wetland D)**, and **130' of ephemeral stream (EPH-1)**. The total impact to waters is **0.335 acres (0.315 ac. of open water, 0.011 ac. of wetlands, and 0.009 ac. of ephemeral)**. The drainage area affected is **4 acres**. The site is located near N38-04-12, W82-40-01. (Nationwide Permit No. 14)
5. Sta. 34+96 – Construct 67' of pipe culvert, with 40' of inlet channel, on a tributary to Harriet Branch. Additionally, daylight 29' of channel by removing an existing culvert. This replaces **107' of ephemeral stream (EPH-2)**. The impact to waters is **0.020 acres**. The drainage area affected is **12 acres**. The site is located near N38-04-10, W82-39-57. (Nationwide Permit No. 14)
6. Sta. 39+92 – Construct 63' of box culvert, with 5' of inlet and 88' of outlet channel; on Whetstone Branch, a tributary to Harriet Branch. This replaces **two existing culverts of 32' and 40'**, and **106' of intermittent stream (INT-2)**. Additionally, place rock protection on **21' of perennial stream (PER-1US)**. The impact to waters is **0.028 acres (0.024 ac. of intermittent and 0.004 ac. of perennial)**. The drainage area affected is **133 acres**. The site is located near N38-04-13, W82-39-52. (Nationwide Permit No. 14, WQC)
7. Sta. 55+50.78 – Construct 37' of entrance pipe, with 49' of outlet/inlet channel to 69' of roadway pipe culvert. This culvert outlets into 87' of undisturbed channel to another 54' of constructed entrance pipe. These impacts are on a tributary to Harriet Branch. This replaces a total of **90' of intermittent stream (INT-3)** and **132' of existing culvert**. The impact to waters is **0.008 acres**. The drainage area affected is **19 acres**. The site is located near N38-04-26, W82-39-45. (Nationwide Permit No. 14, WQC)

8. Sta. 70+82.71 – Construct 112' of pipe culvert, below an existing pond, which outlets into a wetland and tributary to Greenbriar Creek. This replaces **0.077 acres of wetlands** (Wetland C). The drainage area affected is **38 acres**. The site is located near N38-04-36, W82-39-33. (Nationwide Permit No. 14)
9. Right Sta. 73+75 (Appr. Rd. Sta. 52+51.52) – Construct 62' of pipe culvert, with 20' of inlet and 12' of outlet channel, on a tributary to Greenbriar Creek. This replaces **111' of intermittent** stream (INT-4). The impact to waters is **0.013 acres**. The drainage area affected is **42 acres**. The site is located near N38-04-40, W82-39-30. (Nationwide Permit No. 14, WQC)
10. Sta. 75+17.02 – Construct 111' of pipe culvert on a tributary to Greenbriar Creek. This replaces **146' of ephemeral** stream (EPH-3). The impact to waters is **0.012 acres**. The drainage area affected is **10 acres**. The site is located near N38-04-43, W82-39-40. (Nationwide Permit No. 14)
11. Sta. 86+99.76 – Construct 167' of pipe culvert on a tributary to Greenbriar Creek. This replaces **190' of intermittent** stream (INT-5). The impact to waters is **0.009 acres**. The drainage area affected is **42 acres**. The site is located near N38-04-52, W82-39-22. (Nationwide Permit No. 14, WQC)
12. Sta. 97+81.21 – Construct 122' of pipe culvert on a tributary to Greenbriar Creek. This replaces **145' of intermittent** stream (INT-6). The impact to waters is **0.010 acres**. The drainage area affected is **20 acres**. The site is located near N38-05-03, W82-39-21. (Nationwide Permit No. 14, WQC)
13. Right Sta. 100+50 to Left Sta. 110+00 – Construct 173' of box culvert (Sta. 102+22.32), with 121' of inlet and 237' of outlet channel; on Greenbriar Creek. This replaces **622' of perennial** stream (PER-2US&DS). Also construct a channel change on a tributary to Greenbriar Creek that replaces **716' of intermittent** stream (INT-7DS). Additionally, construct 202' of box culvert (Sta. 107+29.55) on another tributary; which replaces **72' of existing culvert** and **36' of intermittent** stream (INT-8). The total impact to waters is **0.347 acres (0.171 ac. of perennial, 0.164 ac. of intermittent, and 0.012 ac. of intermittent; respectively)**. The drainage area affected (at the downstream impact point on Greenbriar Creek) is **858 acres**. The site is located (centrally) near N38-05-10, W82-39-18. (Individual Permit, WQC)
14. Sta. 116+50.83 – Construct 153' of pipe culvert, with 8' of inlet and 38' of outlet channel; on a tributary to Greenbriar Creek. Additionally, construct 215' of channel relocation on another tributary above the outlet end of the proposed culvert. This replaces **66' of existing culvert**, and **182' of intermittent** (INT-7US) and **168' of intermittent** stream (INT-9); respectively. The total impact to waters is **0.033 acres (0.017 ac. and 0.016 ac. of intermittent, respectively)**. The drainage area affected is **41 acres**. The site is located near N38-05-16, W82-39-05. (Nationwide Permit No. 14, WQC)

15. Right Sta. 135+50 to Sta. 145+50 – Construct three entrance pipes (29', 29', and 57') and 1462' of roadside channel, to the inlet of a culvert (SITE 17, listed below); in the headwaters of Smoky Valley Fork. This replaces **two existing culverts (34', 86')**, and **793' of intermittent stream** (two sections of INT-10). The impact to waters is **0.044 acres**. The drainage area affected is **72 acres**. The site is located (centrally) near N38-05-35, W82-38-43. (Individual Permit, WQC)
16. Left Sta. 143+50 – Construct Excess Fill Site #11, on a pond with fringe wetlands, and wetlands below the embankment; on a tributary to Smoky Valley Fork. This replaces a **0.388 acre pond** (Pond #2), **0.024 acres of fringe wetland** (Wetland E), another **0.226 acres of wetland** (Wetland F) with **0.055 acres of open water** (Pond #3), and **188' of ephemeral stream** (EPH-4). The total impact to waters is **0.699 acres (0.443 ac. of open waters, 0.250 ac. of wetlands, and 0.006 ac. of ephemeral)**. The drainage area affected is **29 acres**. The site is located near N38-05-45, W82-38-51. (Individual Permit)
17. Right Sta. 150+00 to 152+60 – Construct Excess Fill Site #10, and a 85' box culvert (Sta. 152+58.50), on a tributary to Smoky Valley Fork. This replaces **445' of intermittent stream** (INT-11US&DS) and **59' of existing culvert**. The impact to waters is **0.079 acres**. The drainage area affected is **102 acres**. The site is located (centrally) near N38-05-37, W82-38-34. (Nationwide Permit No. 14, WQC)
18. Left Sta. 154+00 – Construct Excess Fill Site #9 on a tributary to Smoky Valley Fork. This replaces a **0.049 acre pond** (Pond #4) and **393' of ephemeral stream** (EPH-5). The impact to waters is **0.067 acres (0.049 ac. of open water, and 0.018 ac. of ephemeral)**. The drainage area is **8 acres**. The site is located near N38-05-39, W82-38-32. (Nationwide Permit No. 14)
19. Right Sta. 155+52.00 – Construct Excess Fill Site #8, and 49' of pipe culvert, with 32' of inlet and 38' of outlet channel; on a tributary to Smoky Valley Fork. This replaces **572' of ephemeral stream** (EPH-6). The impact to waters is **0.018 acres**. The drainage area affected is **11 acres**. The site is located near N38-05-38, W82-38-28. (Nationwide Permit No. 14)
20. Right Sta. 162+07.50 – Construct Excess Fill Site #7, and 81' of box culvert, with 40' of inlet and 20' of outlet channel; on a tributary to Smoky Valley Fork. This replaces **1035' of intermittent stream** (1004' of INT-12US&DS, and 31' of INT-13) and **31' of existing culvert**. Additionally, fill **26' of ephemeral stream** (EPH-7). The impact to waters is **0.119 acres (0.118 ac. of intermittent, and 0.001 ac. of ephemeral)**. The drainage area affected is **98 acres**. The site is located near N38-05-41, W82-38-22. (Individual Permit, WQC)
21. Sta. 163+78 – Construct 20' of box culvert, with 25' of inlet and 191' of outlet channel, on Smoky Valley Fork. This replaces **53' of existing culvert** and **183' of perennial stream** (PER-3). The impact to waters is **0.043 acres**. The drainage area affected is **314 acres**. The site is located near N38-05-45, W82-38-22. (Nationwide Permit No. 14, WQC)

22. Right Sta. 165+85 – Construct a 48' pipe culvert, with 562' of new roadside channel inlet; on a tributary to Smoky Valley Fork. This replaces **525' of intermittent stream** (INT-14) and **two existing culverts (19' and 36')**. The impact to waters is **0.033 acres**. The drainage area is **12 acres**. The site is located near N38-05-46, W82-38-19. (Individual Permit, WQC)
23. Right Sta. 168+00 – Construct Excess Fill Site #5 on a tributary to Smoky Valley Fork. This replaces **271' of ephemeral stream** (EPH-8). The impact to waters is **0.019 acres**. The drainage area affected is **6 acres**. The site is located near N38-05-48, W82-38-19. (Nationwide Permit No. 14)
24. Sta. 186+28 – Construct 109' of box culvert, with 24' of inlet and 10' of outlet channel, on a tributary to Smoky Valley Fork. This replaces **143' of intermittent stream** (INT-15). The impact to waters is **0.013 acres**. The drainage area affected is **85 acres**. The site is located near N38-06-05, W82-38-15. (Nationwide Permit No. 14, WQC)
25. Left Sta. 195+73 (Appr. Rd. Sta. 46+92.66) – Construct 80' of pipe culvert, with 22' of inlet and 10' of outlet channel, on a tributary to Smoky Valley Road. This replaces **32' of existing culvert** and **80' of intermittent stream** (INT-16). The impact to waters is **0.008 acres**. The drainage area affected is **62 acres**. The site is located near N38-06-16, W82-38-15. (Nationwide Permit No. 14, WQC)
26. Left Sta. 228+52.6 (Ramp Sta. 49+15.41) – Construct 94' of pipe culvert, with 21' of inlet and 25 feet of outlet channel, on a tributary to Burgess Branch. This replaces **26' of existing culvert** and **114' of intermittent stream** (INT-17). The impact to waters is **0.013 acres**. The drainage area affected is **35 acres**. The site is located near N38-06-20, W82-37-33. (Nationwide Permit No. 14, WQC)
27. US 23, Sta. 1273+20 – Construct 11' of culvert extension, with 222' of outlet channel change, on Burgess Branch. This replaces **24' of existing culvert** and **212' of intermittent stream** (INT-18). The impact to waters is **0.033 acres**. The drainage area affected is **179 acres**. The site is located near N38-06-23, W82-37-34. (Nationwide Permit No. 14, WQC)

**NOTE:**

1. No defined channels or wetlands were found in the areas designed as Excess Fill Site #12, #6, #4, #3 and #1. Site #2 was eliminated. They are shown on the plans for clarification and location.
2. Many of the entrance culverts noted in above descriptions do not have "pipe sheets" available since they are small and did not warrant a design for construction plans.
3. Some streams were assessed in several locations and may be noted as US (upstream), DS (downstream), or combined as such.

**MITIGATION DISCUSSION**  
**Lawrence Co., KY 32 Reconstruction**  
**Item No. 12-284.00**

For intermittent and perennial stream impacts, the need for mitigation was based on whether an impact site was greater than 0.10 acres in area (including wetland impact acreage where appropriate), greater than 300 feet in length, or was determined to be a Special Aquatic Site (i.e., riffle/pool complex). For ephemeral streams, mitigation needs were based on impacts greater than 0.10 acres, but no length was utilized. However, the Division of Water (DOW) not only requires mitigation for intermittent and perennial streams where the impact is greater than 300 feet, but where the cumulative unmitigated impacts, within a 14-digit HUC watershed, exceeds 500 feet. There are four 14-digit HUC's that define the project site; listed below in order from project beginning to end:

|                     |   |                  |
|---------------------|---|------------------|
| Little Blaine Creek | = | 05070204-020-620 |
| Greenbrier Creek    | = | " -020-680       |
| Two Mile Creek      | = | " -010-020       |
| Lick Creek          | = | 05070203-170-230 |

In the Little Blaine Creek watershed (which involves all impacts associated with Harriet Branch) there are impacts to one perennial stream (PER-1) and three intermittent stream (INT-1,2, and 3). One perennial stream impact site is 760', requiring mitigation under both COE and DOW criteria. Since the HUC has accumulative impacts greater than 500', mitigation is required for all remaining intermittent and perennial streams under DOW criteria.

In the Greenbriar Creek watershed there is one site that involves a perennial stream (PER-2) impact of 622' and an intermittent stream (INT-7) impact that is 716'. They require mitigation under both COE and DOW criteria. Although all other intermittent impacts are less than 300', some are riffle/pool complexes that require mitigation under COE guidelines. In any case, they all require mitigation under the "accumulative impacts" criteria of DOW. At SITE 4, where Excess Fill Site#13 will be developed, the total impact to waters is greater than 0.10 acres, requiring mitigation for Wetland D (at 0.011 acres), and EPH-1. Additionally, to mitigate for Pond#1, and assumed stream length was found through the pond and used for another ephemeral stream length.

In the Two Mile Creek watershed, there are four impacts to intermittent streams that exceed 300' (INT-10, INT-11, INT-12, and INT-14). Other shorter impacts are to perennial and intermittent streams that are riffle/pool complexes. However, the DOW "accumulative impacts" criteria will again require all to be mitigated. At SITE 16, where Excess Fill Site#11 will be developed, the total impact to waters is greater than 0.10, requiring mitigation for Wetlands E and F, and EPH-4; as well as assumed stream lengths for Pond#2 and #3.

The Lick Creek watershed has only two intermittent stream impacts, both less than 300'. However, one impacted stream (INT-16) has a riffle/pool complex and would require mitigation under COE regulations.

In summary for streams, all perennials and intermittents impacted on this project, except one, may require mitigation; and several ephemerals require mitigation due to association with impact areas greater than 0.10 acres (COE guidelines).

For wetlands, three require mitigation (Wetlands D, E, and F). Wetland F is greater than 0.10 acres, while Wetlands D and E require mitigation due to association with site impacts greater than 0.10 acres (COE guidelines). The cumulative impact for wetlands is less than 1.0 acres, so no mitigation would have been required under DOW criteria.

Mitigation is proposed by payment of an in lieu fee, based on the Corps of Engineers' Eastern Kentucky Protocol (see the in-lieu fee payment calculation table).

HUC Analysis of Stream Impacts

| HUC #            | HUC Name            | STA.             | Lat. / Long.        | Sheet No. | Impact Category      | Stream Type            | Permit Type  | Watershed (acres) | Impact (ft.) | Impact (acres)    | RBP Score       | Quality                 | Riffle/Pool Complex | Mitigation Required |
|------------------|---------------------|------------------|---------------------|-----------|----------------------|------------------------|--------------|-------------------|--------------|-------------------|-----------------|-------------------------|---------------------|---------------------|
| 05070204-020-620 | Little Blaine Creek | 20+00 to 27+20   | N38-04-08 W82-40-12 | 2         | Culvert & Ch. Change | Perennial Intermittent | Ind. 404/401 | 538               | 760 28       | 0.209 0.002       | 126 139         | Average Average         | Yes Yes             | Yes Yes             |
| "                | "                   | 29+00            | N38-04-09 W82-40-06 | 2         | Culvert              | Perennial              | NWP14/401    | 467               | 87           | 0.014             | 83              | Poor                    | Yes                 | Yes                 |
| "                | "                   | 39+92            | N38-04-13 W82-39-52 | 3         | Culvert              | Perennial Intermittent | NWP14/401    | 133               | 21 106       | 0.004 0.024       | 83 105          | Poor Poor               | Yes Yes             | Yes Yes             |
| "                | "                   | 55+51            | N38-04-26 W82-39-45 | 4         | Culvert              | Intermittent           | NWP14/401    | 19                | 90           | 0.008             | 102             | Poor                    | Yes                 | Yes                 |
| 05070204-020-680 | Greenbriar Ck.      | 73+75 (52+52)    | N38-04-40 W82-39-30 | 5         | Culvert              | Intermittent           | NWP14/401    | 42                | 111          | 0.013             | 108             | Poor                    | No                  | Yes                 |
| "                | "                   | 86+99            | N38-04-52 W82-39-22 | 6         | Culvert              | Intermittent           | NWP14/401    | 42                | 190          | 0.009             | 115             | Poor                    | Yes                 | Yes                 |
| "                | "                   | 97+81            | N38-05-03 W82-39-21 | 7         | Culvert              | Intermittent           | NWP14/401    | 20                | 145          | 0.010             | 120             | Average                 | Yes                 | Yes                 |
| "                | "                   | 100+50 to 110+00 | N38-05-10 W82-39-18 | 7         | Culvert & Ch. Change | Perennial Intermittent | Ind. 404/401 | 858               | 622 716 72   | 0.171 0.164 0.012 | 145 av. 129 120 | Average Average Average | Yes Yes Yes         | Yes Yes Yes         |
| "                | "                   | 116+51           | N38-05-16 W82-39-45 | 8         | Culvert & Ch. Change | Intermittent           | NWP14/401    | 41                | 182 168      | 0.017 0.016       | 109 83          | Poor Poor               | Yes Yes             | Yes Yes             |
| 05070204-010-020 | Two Mile Ck.        | 135+50 to 145+50 | N38-05-35 W82-38-43 | 9,10      | Culvert & Ch. Change | Intermittent           | Ind 404/401  | 72                | 793          | 0.044             | 104             | Poor                    | Yes                 | Yes                 |
| "                | "                   | 150+00 to 152+60 | N38-05-37 W82-38-34 | 10        | Culvert & Fill       | Intermittent           | NWP14/401    | 102               | 445          | 0.079             | 133             | Average                 | Yes                 | Yes                 |
| "                | "                   | 162+08           | N38-05-41 W82-38-22 | 11        | Culvert & Fill       | Intermittent           | Ind. 404/401 | 98                | 1004 31      | 0.116 0.002       | 120 av. 108     | Average Poor            | Yes Yes             | Yes Yes             |
| "                | "                   | 163+78           | N38-05-45 W82-38-22 | 11        | Culvert              | Perennial              | NWP14/401    | 314               | 183          | 0.043             | 85              | Poor                    | Yes                 | Yes                 |
| "                | "                   | 165+85           | N38-05-46 W82-38-19 | 11        | Fill                 | Intermittent           | Ind.404/401  | 12                | 525          | 0.033             | 79              | Poor                    | No                  | Yes                 |
| "                | "                   | 166+28           | N38-06-05 W82-38-15 | 13        | Culvert              | Intermittent           | NWP14/401    | 85                | 143          | 0.013             | 101             | Poor                    | No                  | Yes                 |
| "                | "                   | 195+73 (46+93)   | N38-06-16 W82-38-15 | 13        | Culvert              | Intermittent           | NWP14/401    | 62                | 80           | 0.008             | 96              | Poor                    | Yes                 | Yes                 |
| 05070203-170-230 | Lick Creek          | 228+53 (49+15)   | N38-06-20 W82-37-33 | 15        | Culvert              | Intermittent           | NWP14/401    | 35                | 114          | 0.013             | 113             | Poor                    | Yes                 | Yes                 |
| "                | "                   | 1273+20 (US 23)  | N38-06-23 W82-37-34 | 15        | Culvert              | Intermittent           | NWP14/401    | 179               | 212          | 0.033             | 124             | Average                 | No                  | No                  |



# SUMMARY OF IMPACTS ALONG ROADWAY REQUIRING MITIGATION

| Site Number | Waterway Stream ID | Project Location | Impact Type  | Perennial | Intermittent | Fee   | Mitigation        | Fee          |
|-------------|--------------------|------------------|--------------|-----------|--------------|-------|-------------------|--------------|
| 2           | PER-1DS            | 20+00 to 27+20   | Perennial    | 126       | 760          | 0.209 | culvert&ch.change | 229,824.00   |
|             | INT-1              | "                | Intermittent | 129       | 28           | 0.002 | culvert           | 5,712.00     |
| 3           | PER-1US            | 29+00            | Perennial    | 83        | 87           | 0.014 | culvert           | 24,273.00    |
| 6           | PER-1US            | 39+92            | Perennial    | 83        | 21           | 0.004 | culvert           | 5,859.00     |
|             | INT-2              | "                | Intermittent | 105       | 106          | 0.024 | "                 | 20,097.60    |
| 7           | INT-3              | 55+51            | Intermittent | 102       | 90           | 0.008 | culvert           | 16,848.00    |
| 9           | INT-4              | 73+75 (52+52)    | Intermittent | 98        | 111          | 0.013 | culvert           | 20,646.00    |
| 11          | INT-5              | 86+99            | Intermittent | 115       | 190          | 0.009 | culvert           | 37,164.00    |
| 12          | INT-6              | 97+81            | Intermittent | 120       | 145          | 0.010 | culvert           | 28,710.00    |
| 13          | PER-2US            | 100+50 to 110+00 | Perennial    | 136       | 311          | 0.064 | culvert&ch.change | 96,845.00    |
|             | PER-2DS            | "                | Perennial    | 153       | 311          | 0.107 | "                 | 104,122.80   |
|             | INT-7DS            | "                | Intermittent | 129       | 716          | 0.164 | ch. change        | 146,064.00   |
|             | INT-8              | "                | Intermittent | 120       | 72           | 0.012 | culvert           | 14,256.00    |
| 14          | INT-7US            | 116+51           | Intermittent | 109       | 182          | 0.017 | culvert           | 34,944.00    |
|             | INT-9              | "                | Intermittent | 83        | 168          | 0.016 | ch. change        | 31,248.00    |
| 15          | INT-10             | 135+50 to 145+50 | Intermittent | 103       | 793          | 0.044 | culvert&ch.change | 149,401.20   |
| 17          | INT-11DS           | 150+00 to 152+60 | Intermittent | 72        | 68           | 0.023 | culvert           | 12,648.00    |
| 20          | INT-12DS           | 162+08           | Intermittent | 104       | 111          | 0.013 | culvert           | 20,912.40    |
| 21          | PER-3              | 163+78           | Perennial    | 85        | 183          | 0.043 | culvert           | 51,057.00    |
| 22          | INT-14             | 165+85           | Intermittent | 79        | 525          | 0.033 | culvert&fill      | 97,650.00    |
| 24          | INT-15             | 186+28           | Intermittent | 101       | 143          | 0.013 | culvert           | 26,769.60    |
| 25          | INT-16             | 195+73 (46+93)   | Intermittent | 96        | 80           | 0.008 | culvert           | 14,880.00    |
| 26          | INT-17             | 228+53 (49+15)   | Intermittent | 113       | 114          | 0.013 | culvert           | 22,161.60    |
| 27          | INT-18             | 1273+20          | Intermittent | 124       | 212          | 0.033 | culvert           | 42,484.80    |
| Total Fee = |                    |                  |              |           |              |       |                   | 1,254,578.00 |

Note: Impacts from Excess Fill Sites are listed on separate chart.

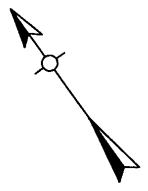
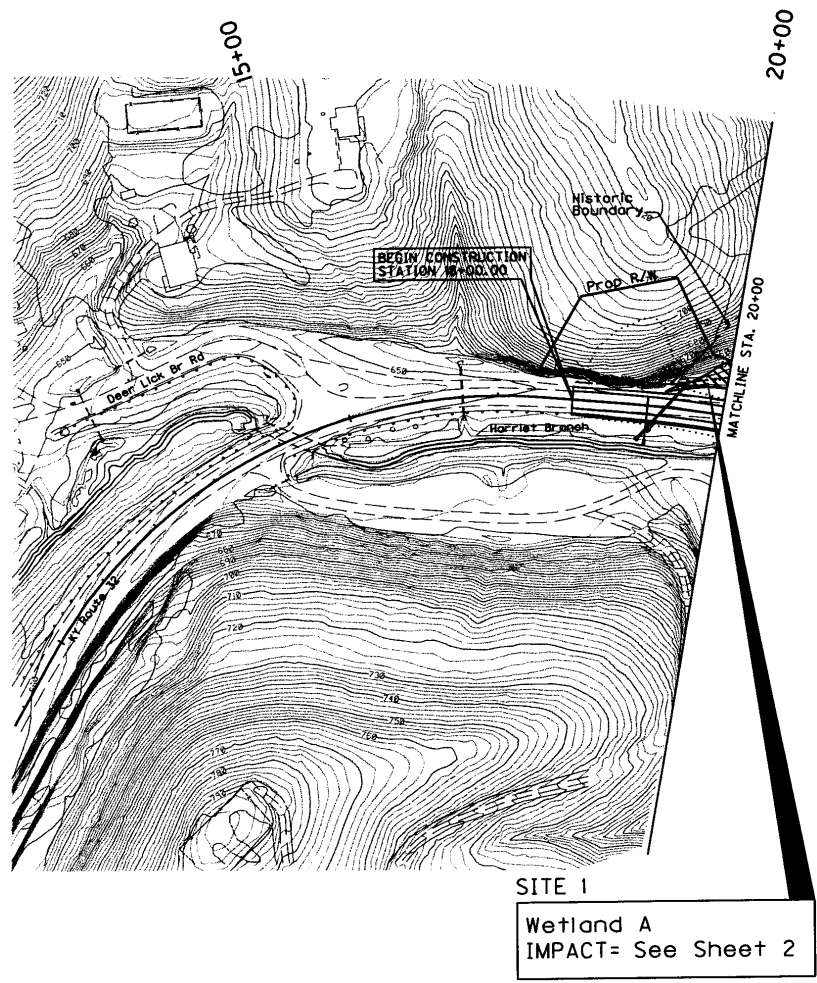
# SUMMARY OF IMPACTS AT EXCESS FILL SITES REQUIRING MITIGATION

| Site Number | Wetland Site | Length (ft)     | Wetland Type | Area (sq ft) | Volume (cu yd) | Rate (cu yd/sq ft) | Fill Type      | Cost (\$)  |
|-------------|--------------|-----------------|--------------|--------------|----------------|--------------------|----------------|------------|
| 4           | Pond#1       | 32+00 (EFS#13)  | (Ephemeral)  | 91           | 170 (est.)*    | 0.012              | fill           | 15,810.00  |
|             | EPH-1        |                 | Ephemeral    | 91           | 130            | 0.009              | fill           | 12,090.00  |
|             | Wetland D    |                 |              |              |                | 0.011              | fill           | 792.00     |
|             |              |                 |              |              |                |                    | Fill Site #13= | 28,692.00  |
| 16          | Pond#2       | 143+50 (EFS#11) | (Ephemeral)  | 91           | 160 (est.)*    | 0.005              | fill           | 14,880.00  |
|             | Pond#3       |                 | (Ephemeral)  | 91           | 100 (est.)*    | 0.003              | fill           | 9,300.00   |
|             | Wetland E    |                 |              |              |                | 0.024              | fill           | 1,728.00   |
|             | Wetland F    |                 |              |              |                | 0.226              | fill           | 16,272.00  |
|             | EPH-4        |                 | Ephemeral    | 91           | 188            | 0.005              | fill           | 17,484.00  |
|             |              |                 |              |              |                |                    | Fill Site #11= | 59,664.00  |
| 17          | INT-11US     | 151+00 (EFS#10) | Intermittent | 133          | 377            | 0.056              | fill           | 77,812.80  |
|             |              |                 |              |              |                |                    | Fill Site #10= | 77,812.80  |
| 20          | INT-12US     | 162+08 (EFS#7)  | Intermittent | 135          | 893            | 0.103              | fill           | 185,386.80 |
|             | INT-13       |                 | Intermittent | 108          | 31             | 0.002              | fill           | 5,914.80   |
|             | EPH-7        |                 | Ephemeral    | 91           | 26             | 0.001              | fill           | 2,418.00   |
|             |              |                 |              |              |                |                    | Fill Site #7=  | 193,719.60 |
| Total Fee = |              |                 |              |              |                |                    |                | 359,888.40 |

Wetland Fee = (acreage) X 2:1 X \$30,000 X 1.2

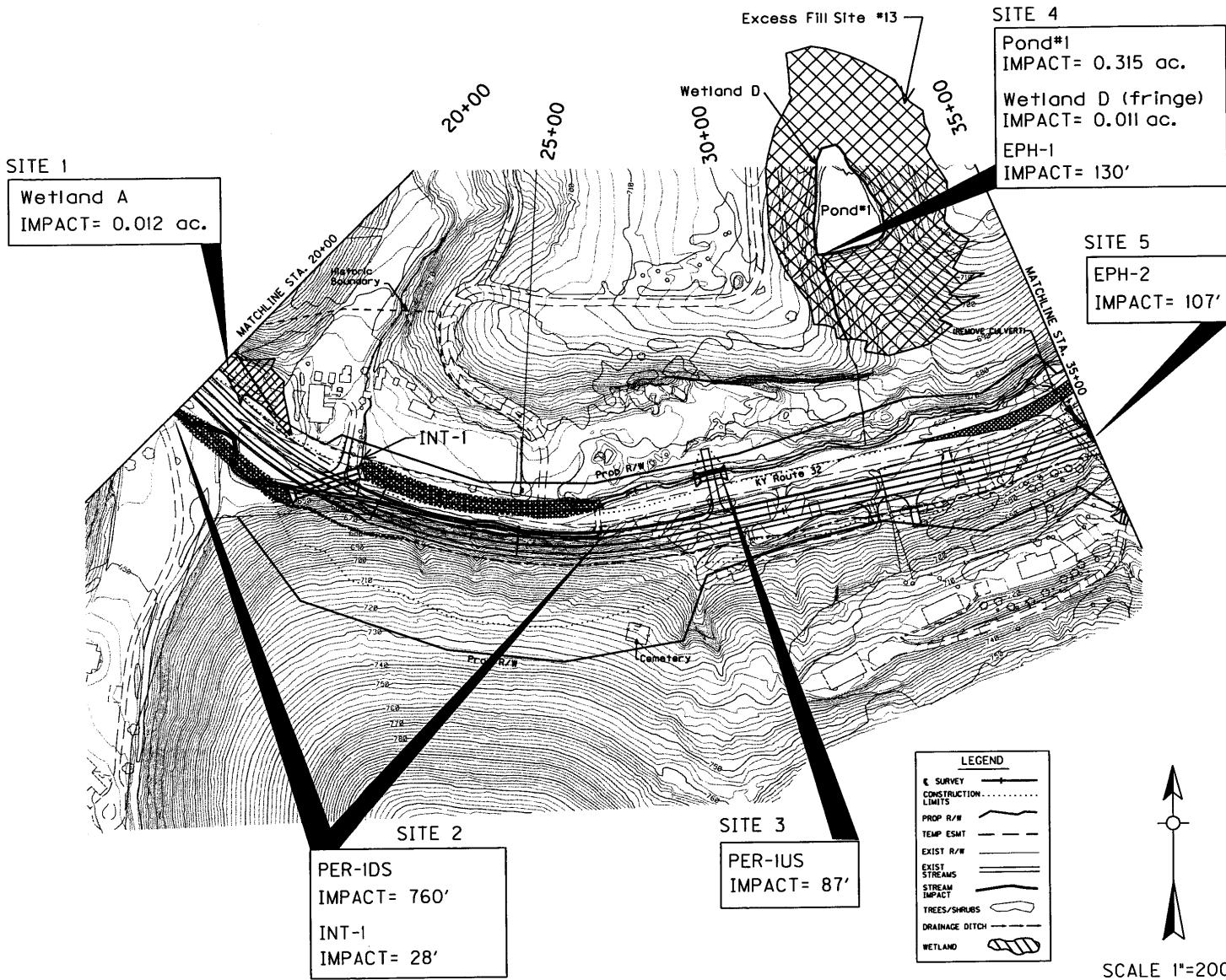
\*Estimated lengths thru ponds

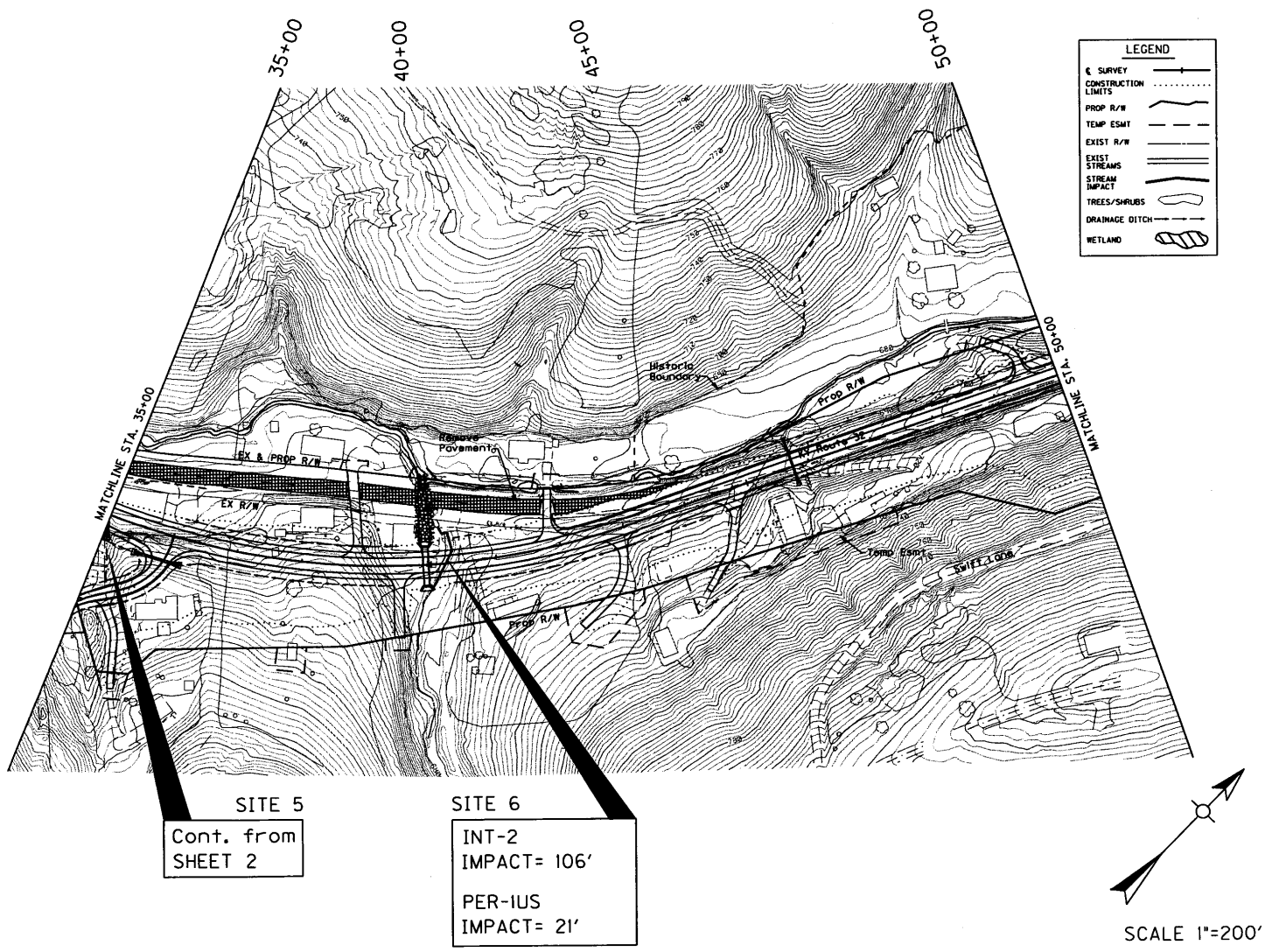
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|----------------------------|-----------------|--------------------------------|------------------------|
| Kentucky<br>Transportation |                 | PROJECT: KY 32                 | Stream: Horrier Branch |
| COUNTY: LAMERGE            | STATE: KENTUCKY | Project Beginning to STA 20+00 | ITEM: 12-284.00        |
|                            |                 | PLAN SHEET 1                   |                        |

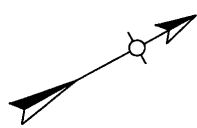
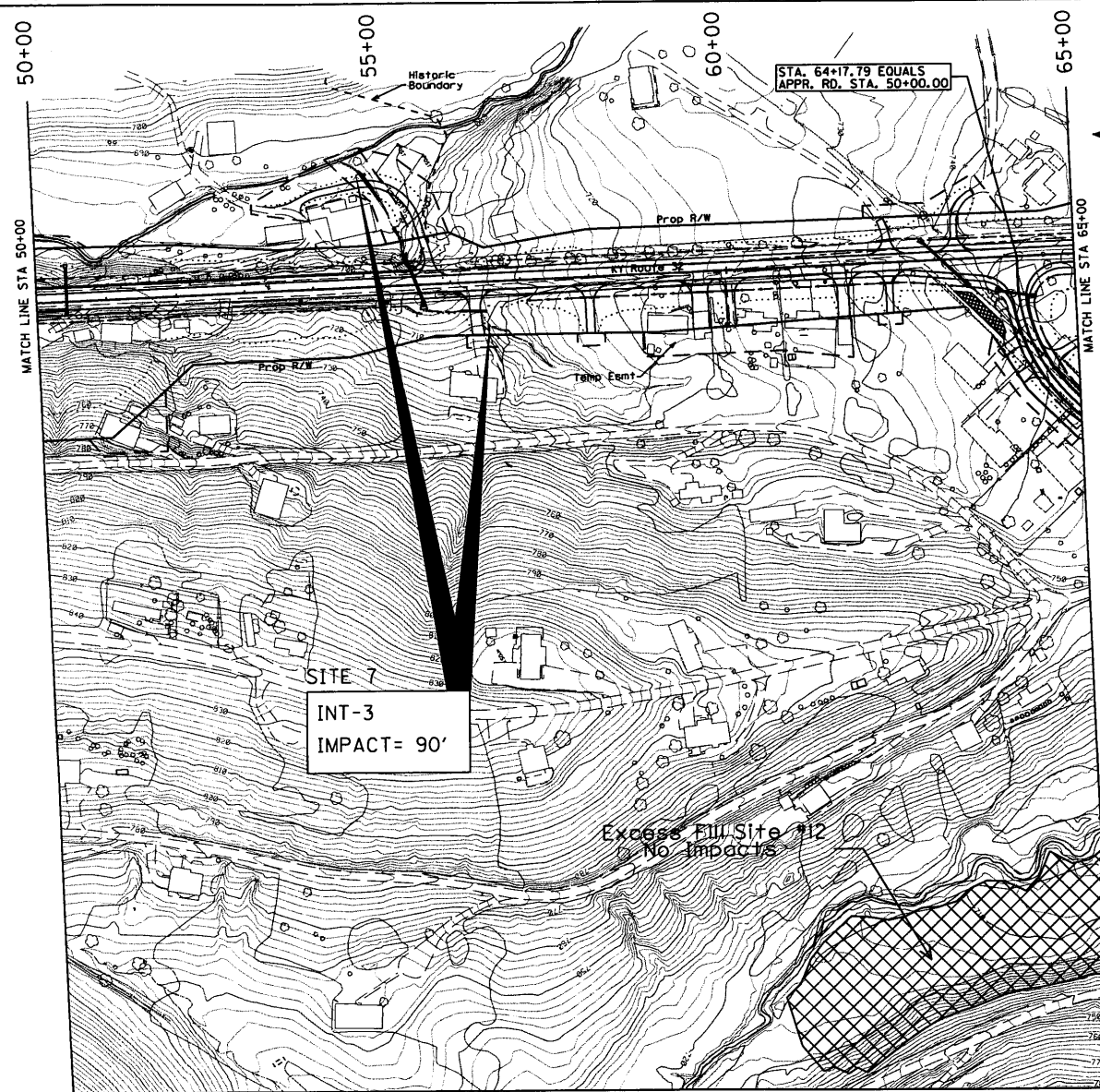


| LEGEND              |     |
|---------------------|-----|
| 6 SURVEY            | --- |
| CONSTRUCTION LIMITS | --- |
| PROP R/W            | --- |
| TEMP ESMT           | --- |
| EXIST R/W           | --- |
| EXIST STREAMS       | --- |
| STREAM IMPACT       | --- |
| TREES/SHRUBS        | --- |
| DRAINAGE DITCH      | --- |
| WETLAND             | --- |

SCALE 1"=200'

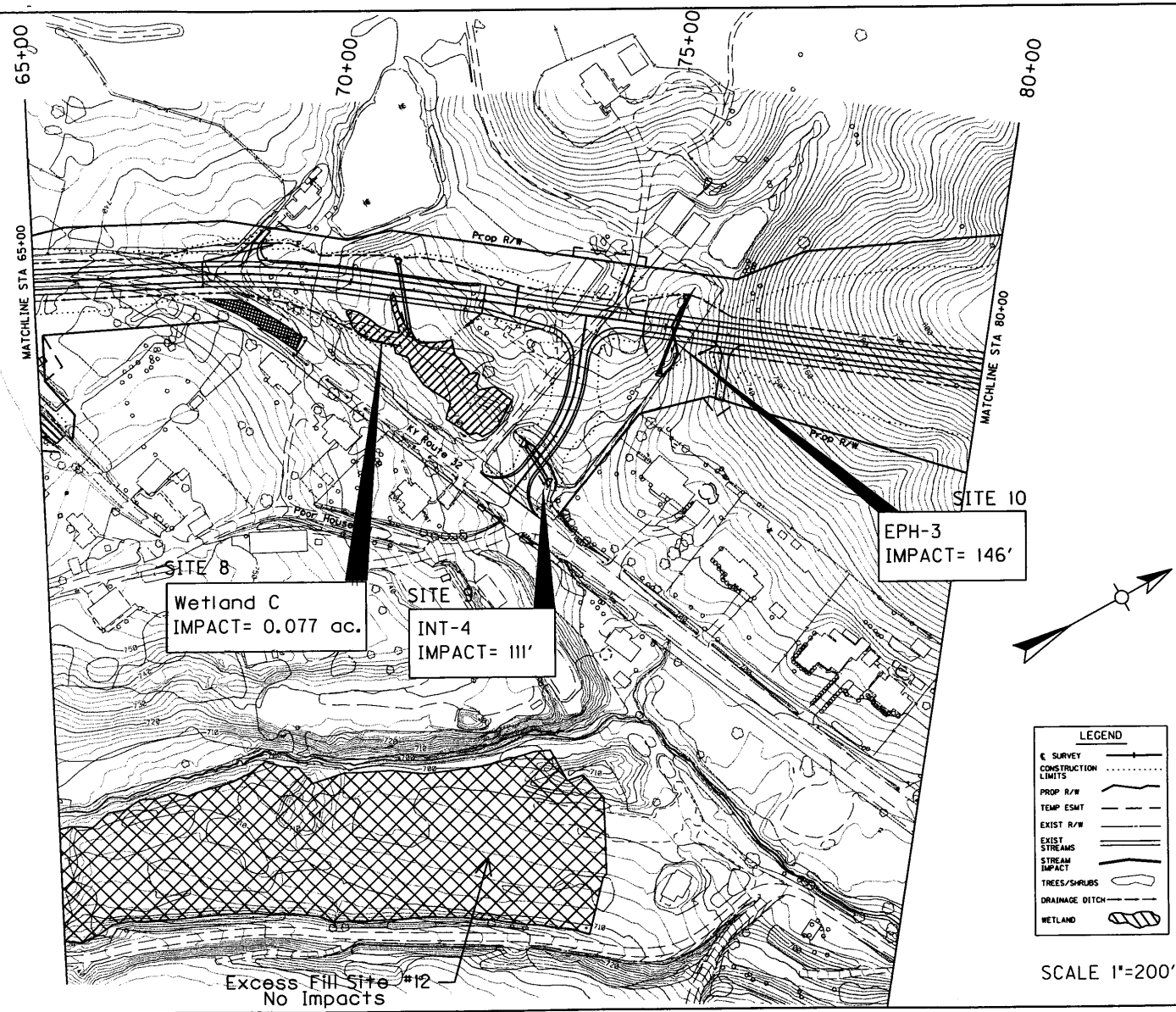




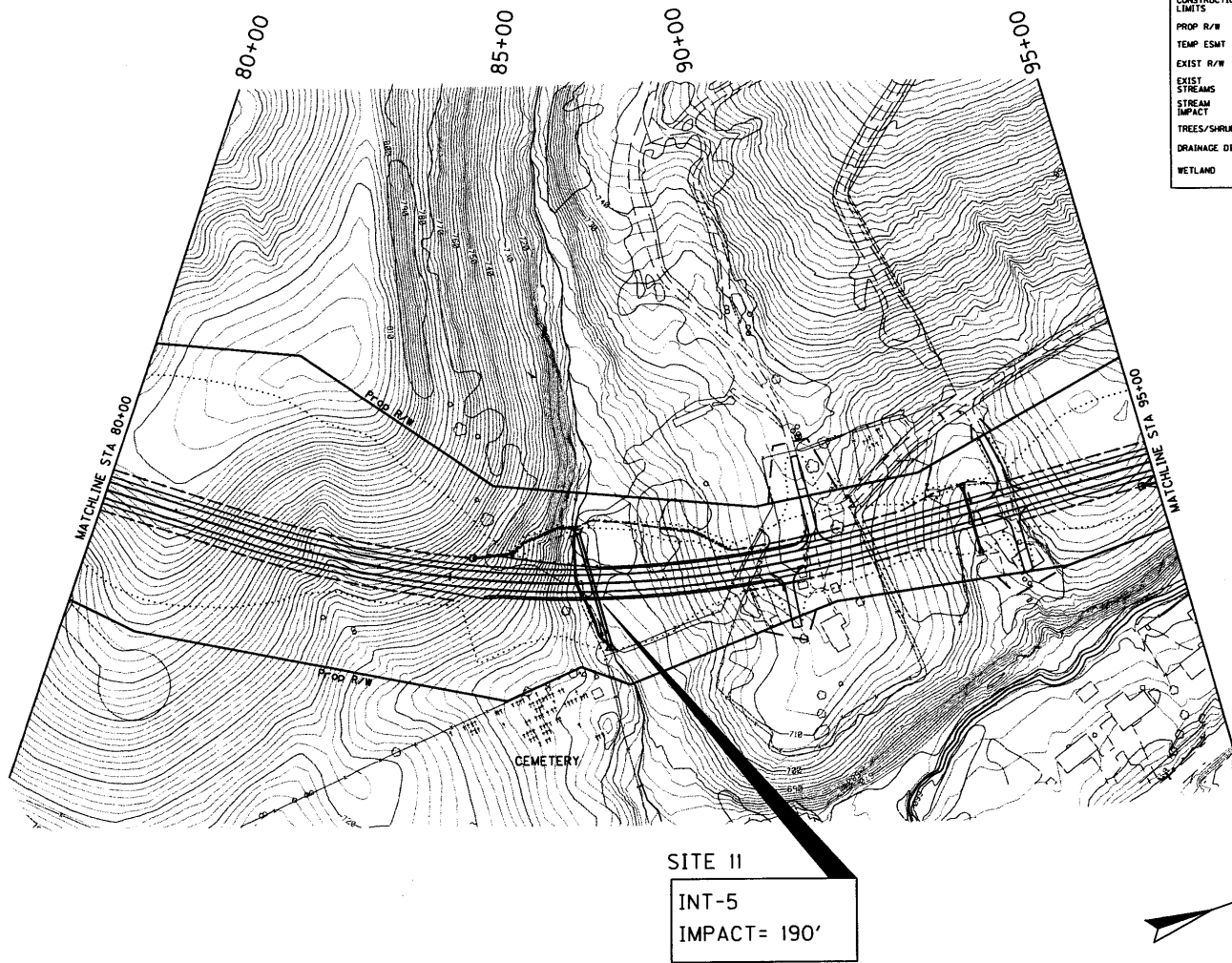


| LEGEND |                     |
|--------|---------------------|
|        | SURVEY              |
|        | CONSTRUCTION LIMITS |
|        | PROP. R/W           |
|        | TEMP. ESMT          |
|        | EXIST. R/W          |
|        | STREAM              |
|        | STREAM IMPACT       |
|        | TREES/SHRUBS        |
|        | DRAINAGE DITCH      |
|        | WETLAND             |

SCALE 1"=200'



SCALE 1"=200'



LEGEND

○ SURVEY

CONSTRUCTION LIMITS

PROP. R/W

TEMP. ESMIT

EXIST. R/W

EXIST. STREAMS

STREAM IMPACT

TREES/SHRUBS

DRAINAGE DITCH

WETLAND

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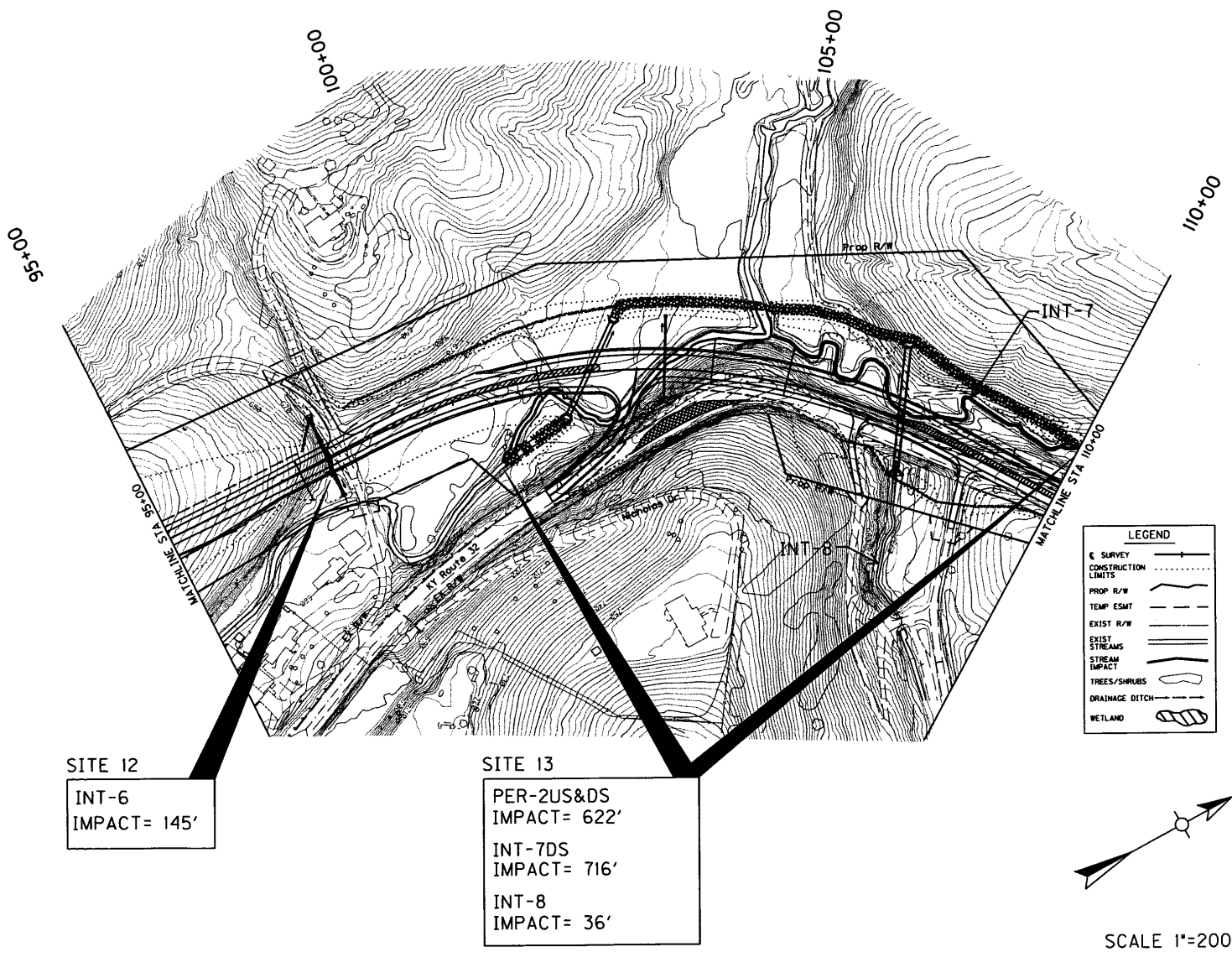
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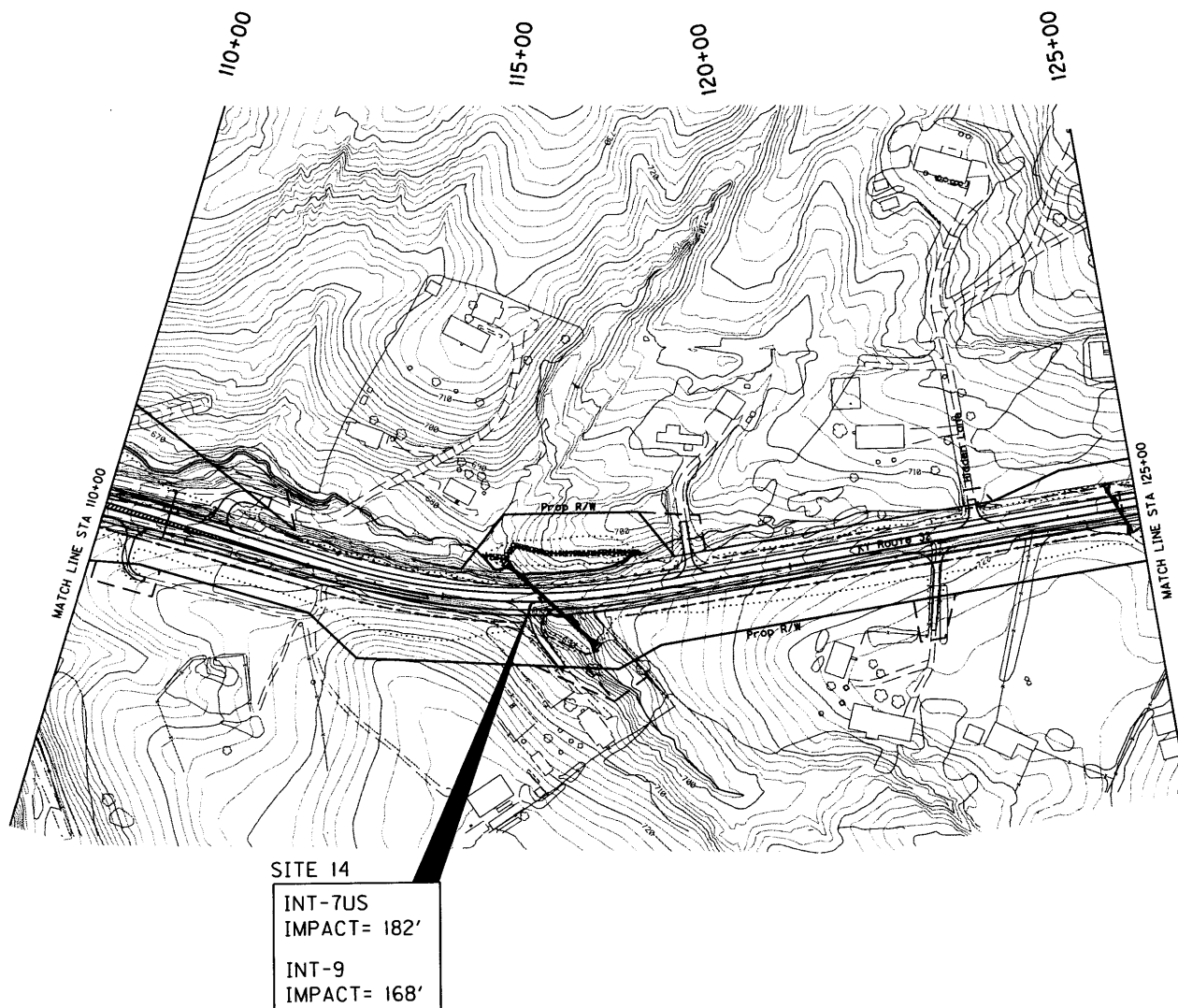
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SCALE 1"=200'













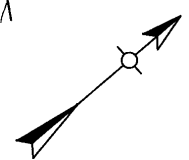


SITE 14

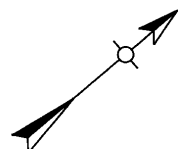
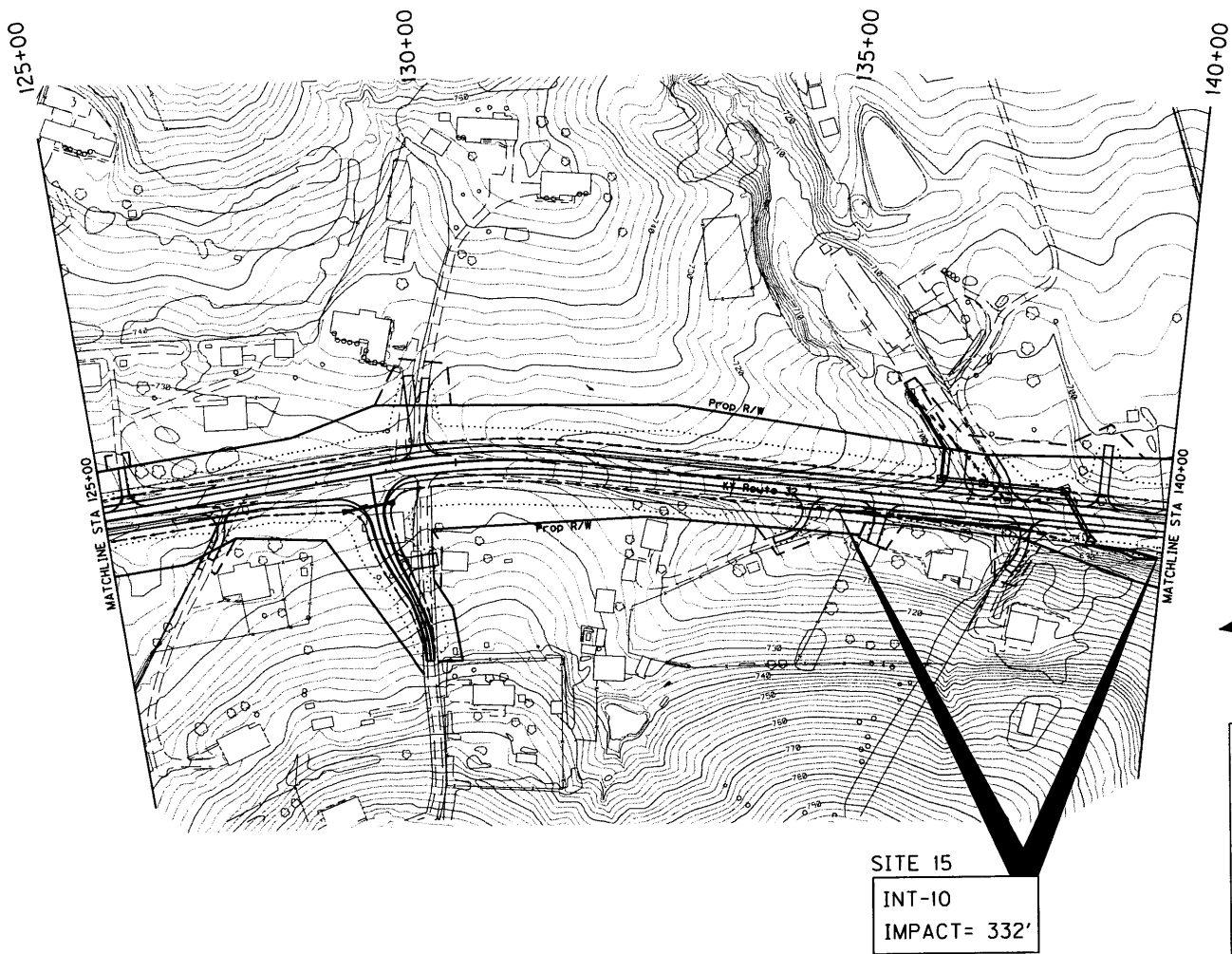
|              |
|--------------|
| INT-7US      |
| IMPACT= 182' |
| INT-9        |
| IMPACT= 168' |

**LEGEND**

|                     |   |
|---------------------|---|
| SURVEY              |  |
| CONSTRUCTION LIMITS |  |
| PROP R/W            |  |
| TEMP ESMT           |  |
| EXIST R/W           |  |
| EXIST STREAMS       |  |
| STREAM IMPACT       |  |
| TREES/SHRUBS        |  |
| DRAINAGE DITCH      |  |
| WETLAND             |  |

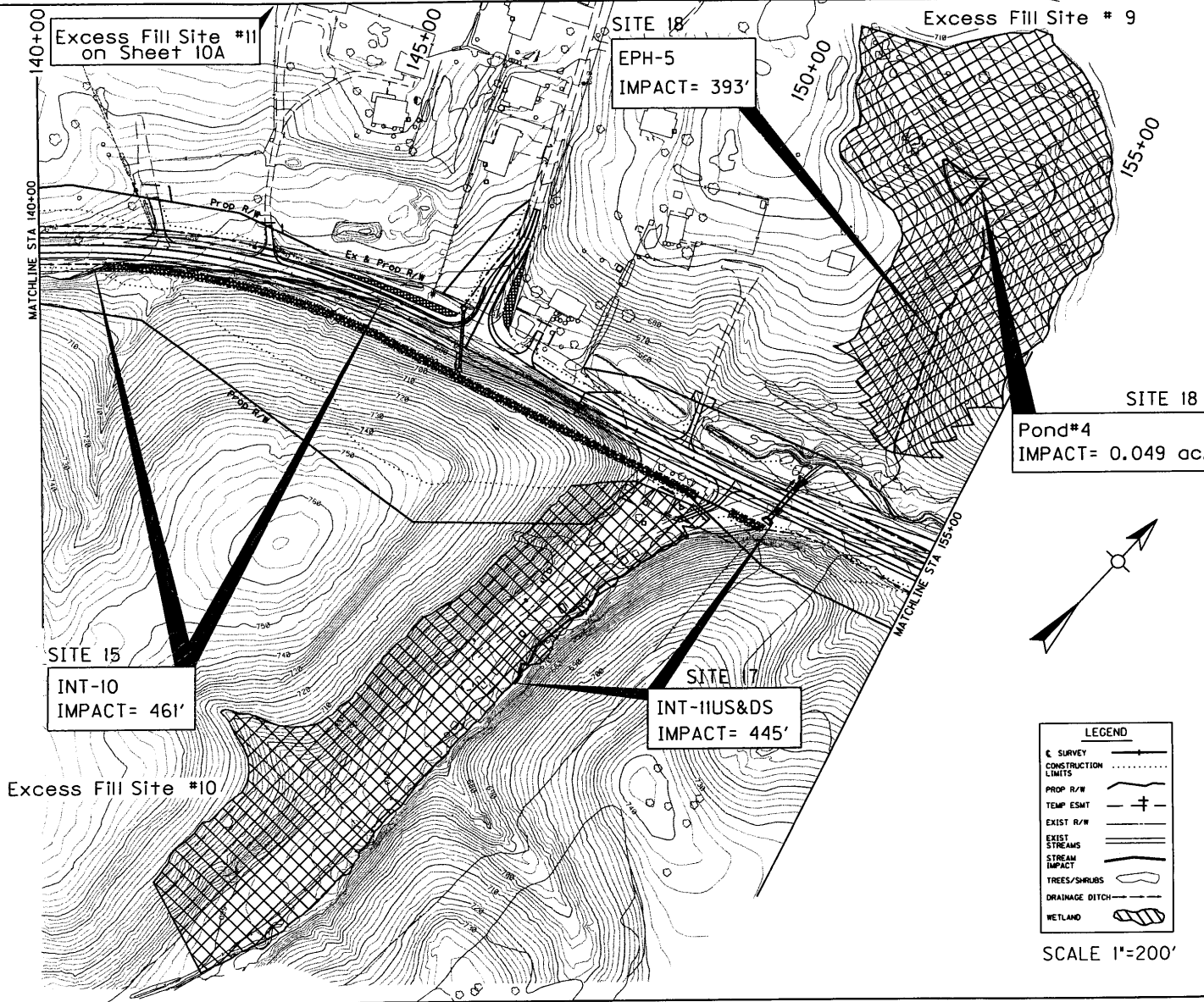


SCALE 1"=200'



| LEGEND              |         |
|---------------------|---------|
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| CONSTRUCTION LIMITS | - - - - |
| PROP. R/W           | —       |
| TEMP. ESMT          | - - - - |
| EXIST. R/W          | —       |
| EXIST. STREAMS      | —       |
| STREAM IMPACT       | —       |
| TREES/SHRUBS        | —       |
| DRAINAGE DITCH      | —       |
| WETLAND             | —       |

SCALE 1"=200'



SITE 16

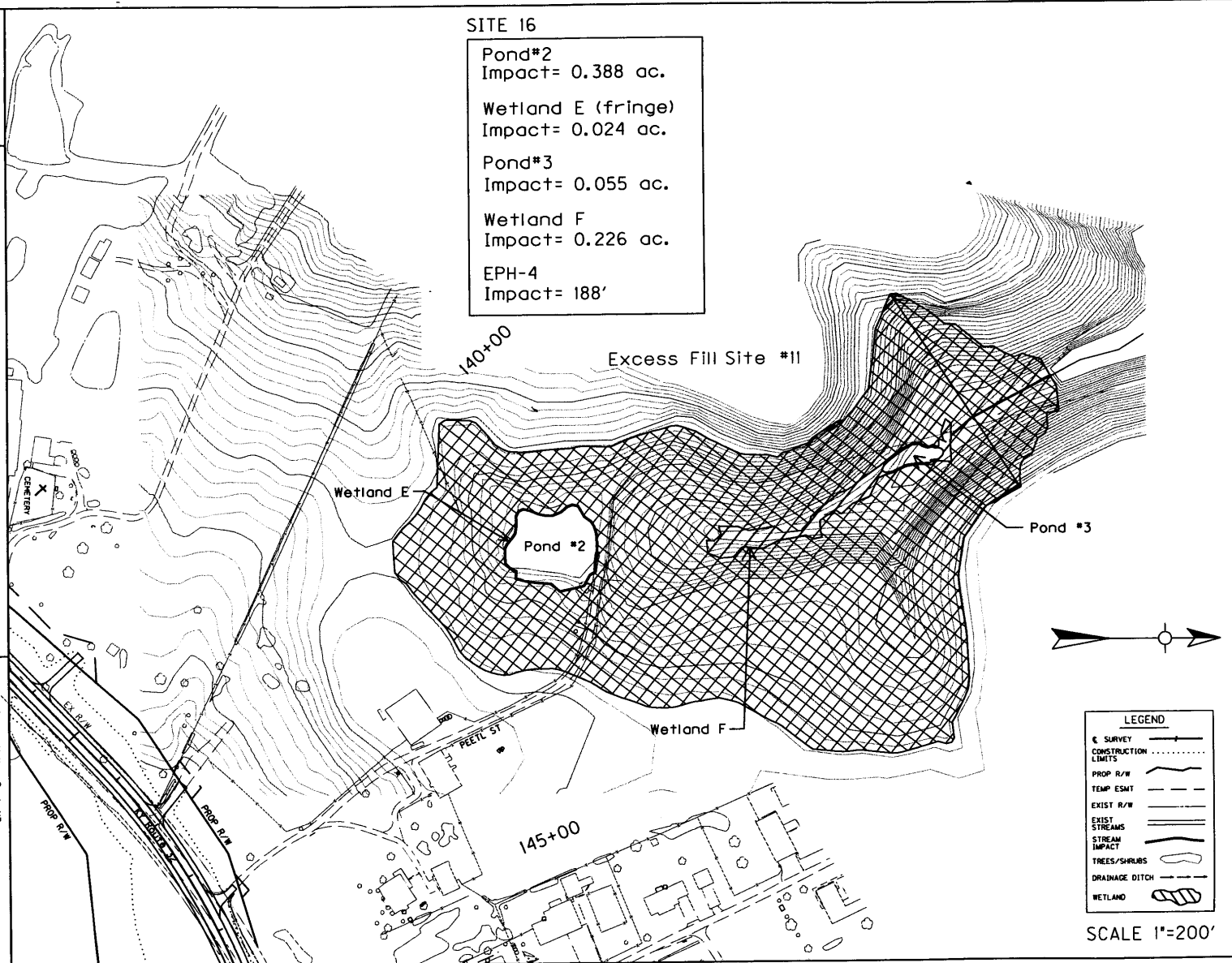
Pond #2  
Impact= 0.388 ac.

Wetland E (fringe)  
Impact= 0.024 ac.

Pond #3  
Impact= 0.055 ac.

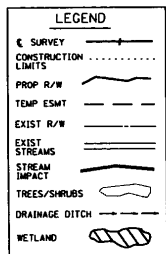
Wetland F  
Impact= 0.226 ac.

EPH-4  
Impact= 188'



| LEGEND              |     |
|---------------------|-----|
| ⊙ SURVEY            | —   |
| CONSTRUCTION LIMITS | --- |
| PROP. R/W           | --- |
| TEMP. ESMT          | --- |
| EXIST. R/W          | --- |
| EXIST. STREAMS      | --- |
| STREAM IMPACT       | --- |
| TREES/SHRUBS        | --- |
| DRAINAGE DITCH      | --- |
| WETLAND             | --- |

SCALE 1"=200'



Excess Fill Site #6  
No Impacts

SITE 19

EPH-6  
IMPACT= 572'

Excess Fill Site #8

SITE 20

INT-12US&DS,13  
IMPACT= 1004',31'

Excess Fill Site #7

SITE 20

EPH-7  
IMPACT= 26'

SITE 21

PER-3  
IMPACT= 183'

SITE 22

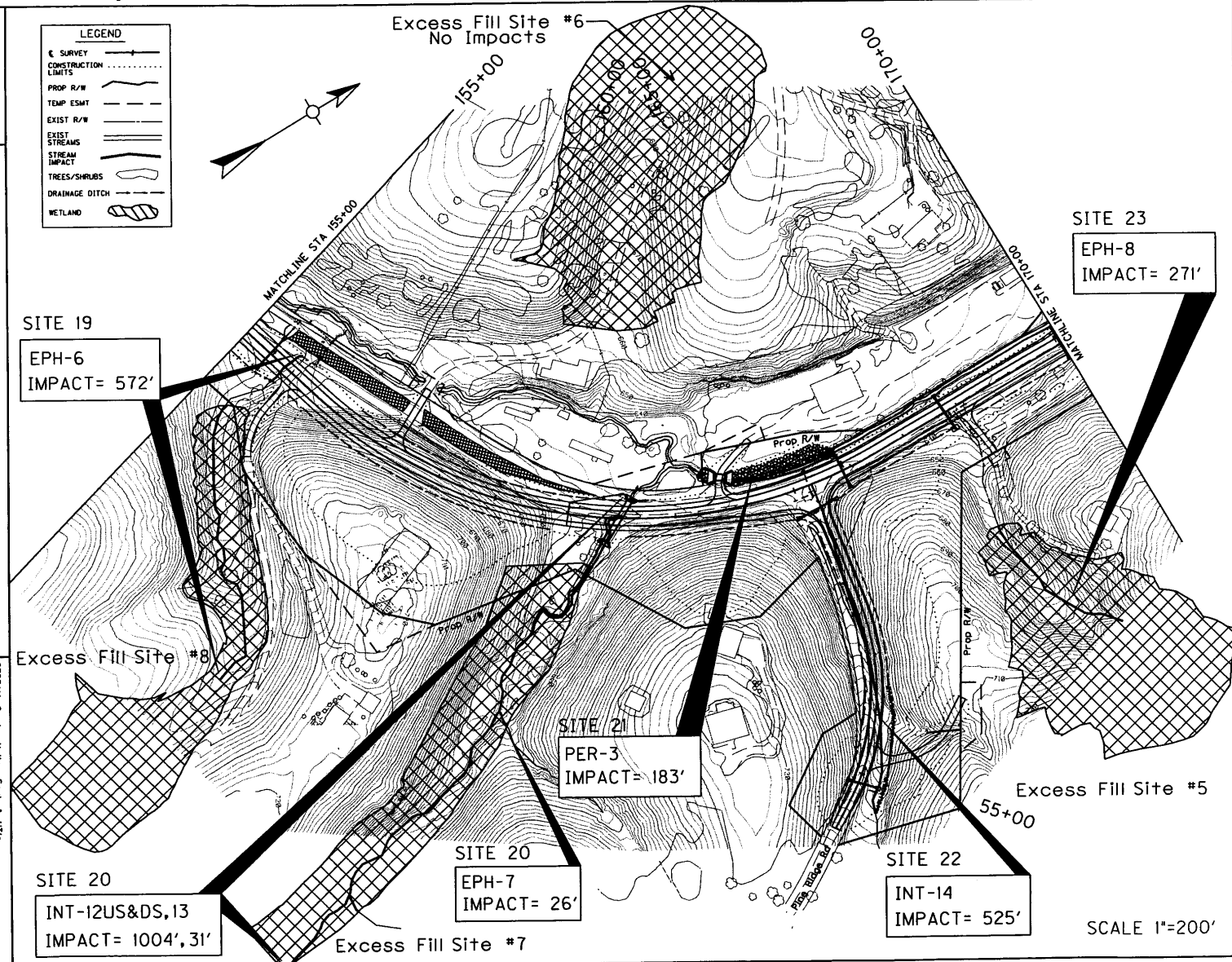
INT-14  
IMPACT= 525'

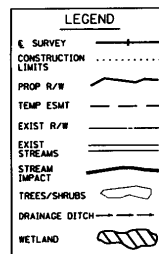
Excess Fill Site #5

SITE 23

EPH-8  
IMPACT= 271'

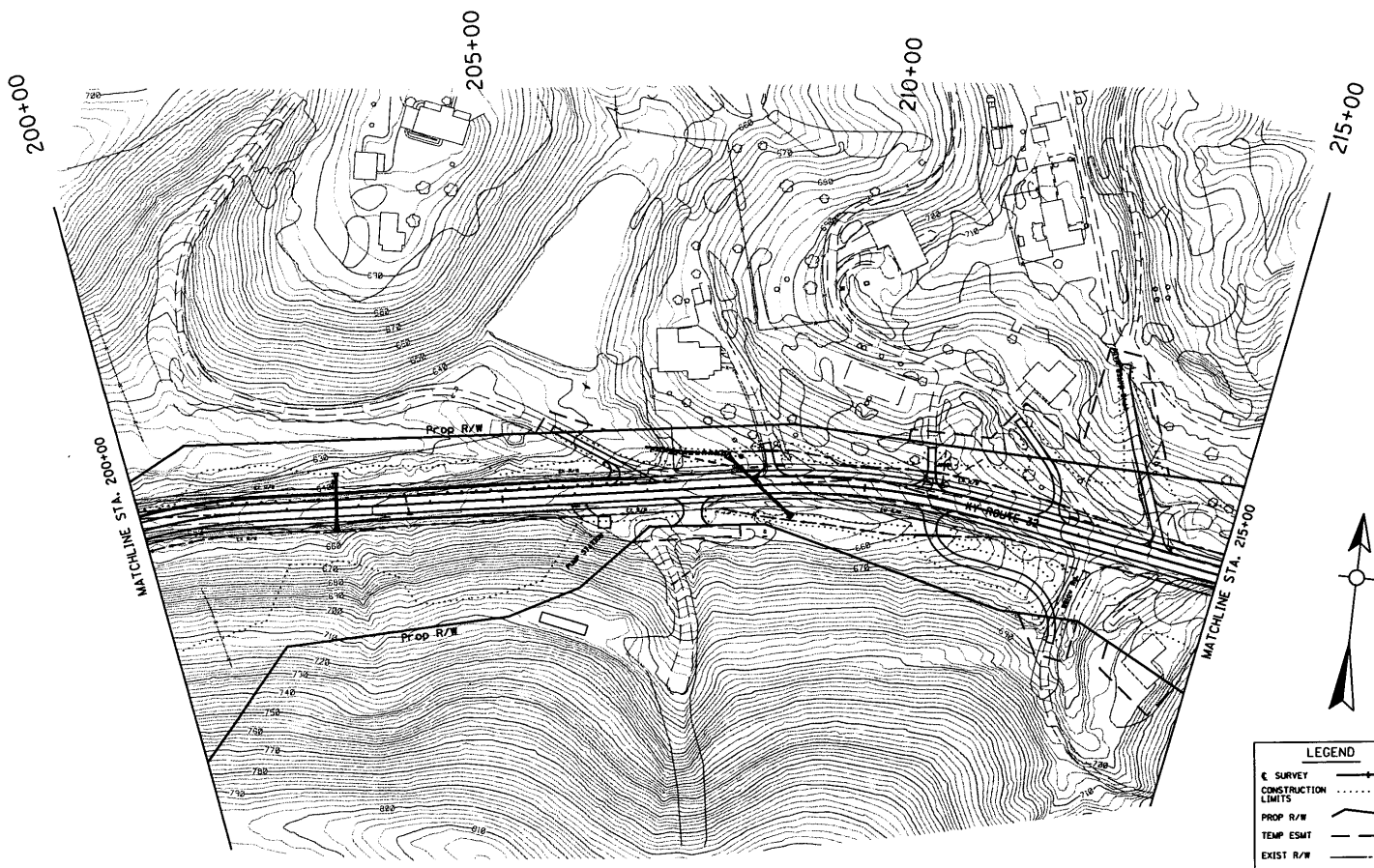
SCALE 1"=200'





SCALE 1"=200'





NO IMPACT THIS SHEET


**LEGEND**

- ◊ SURVEY
- CONSTRUCTION LIMITS
- PROP R/W
- TEMP ESM
- EXIST R/W
- STREAMS
- STREAM IMPACT
- TREES/SHRUBS
- DRAINAGE DITCH
- WETLAND

SCALE 1"=200'

**LEGEND**

|       |                |
|-------|----------------|
| —     | § SURVEY       |
| —     | CONSTRUCTION   |
| ..... | LIMITS         |
| —     | PROP. R/W      |
| —     | TEMP. ES&T     |
| —     | EXIST. R/W     |
| —     | EXIST. STREAMS |
| —     | STREAM IMPACT  |
| —     | TREES/SHRUBS   |
| —     | DRAINAGE DITCH |
| —     | WETLAND        |



Excess Fill Site #1  
No Impacts

INT-18  
IMPACT = 212'

MATCHLINE STA. 215+00

215+00

220+00

US ROUTE 23

SITE 26

INT-17  
IMPACT = 114'

STA. 50+00.00 RAMP TO KY 32  
EQUAL STA. 228+52.56 KY 32

Excess Fill Site #3  
No Impacts

SCALE 1"=200'

## Kentucky

PROJECT: KY 32

## Transportation

COUNTY: LAWRENCE

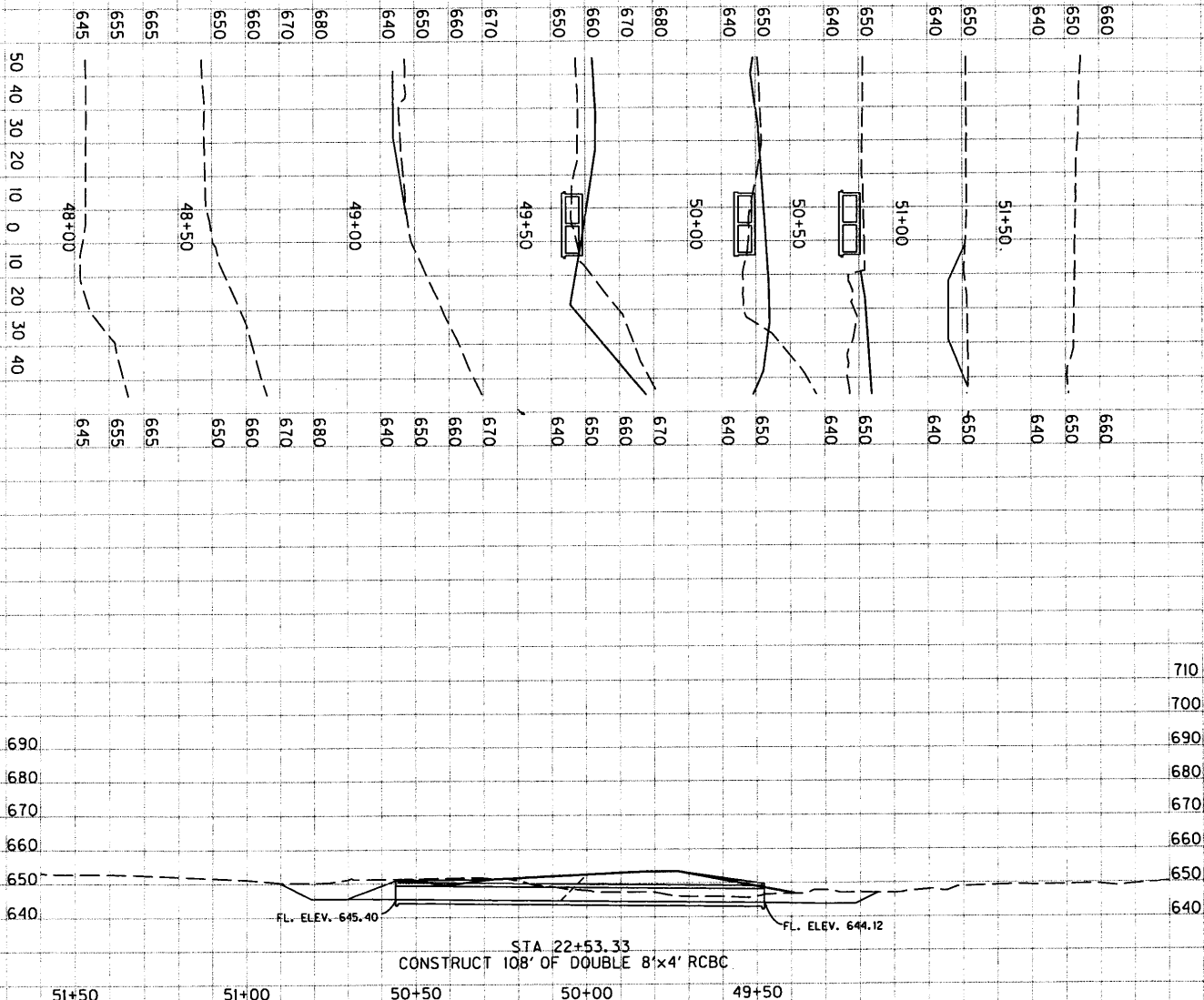
STATE, KENTUCKY

STA 215+00 to STA 223+50

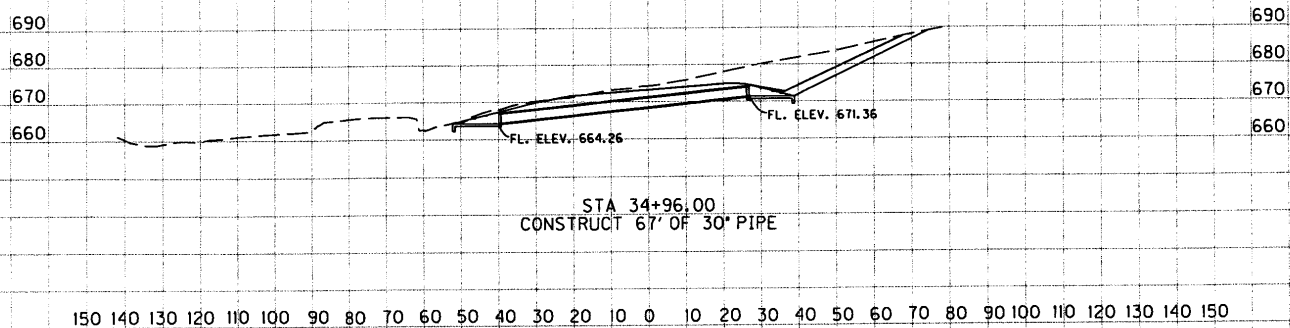
**STREAM:** Burgess Branch & UT's

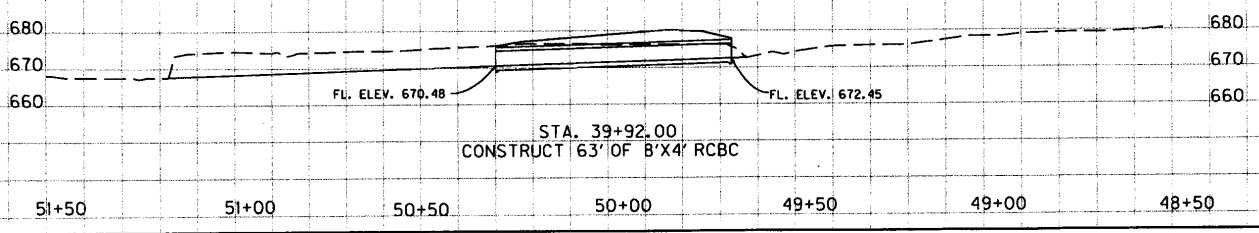
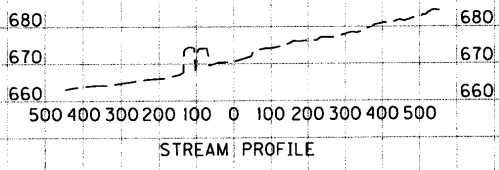
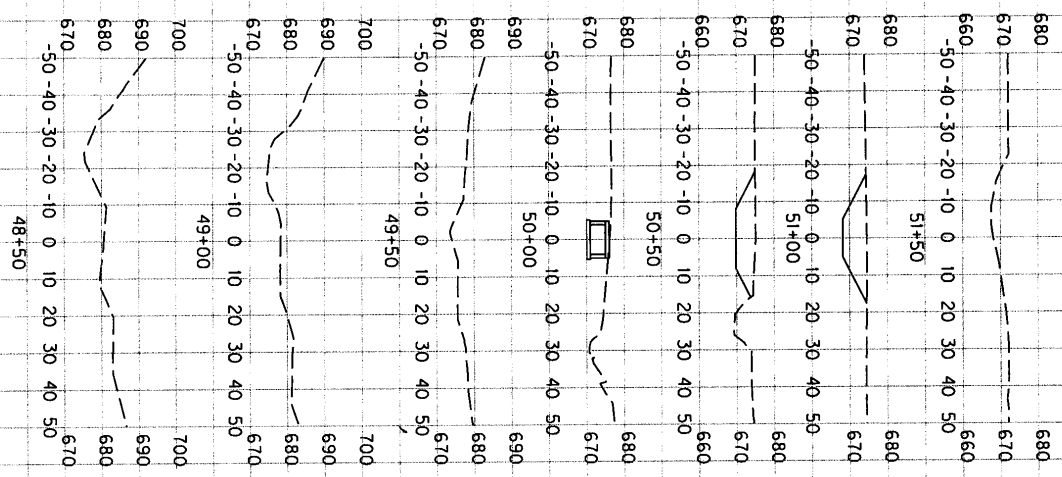
ITEM: 12-284.00

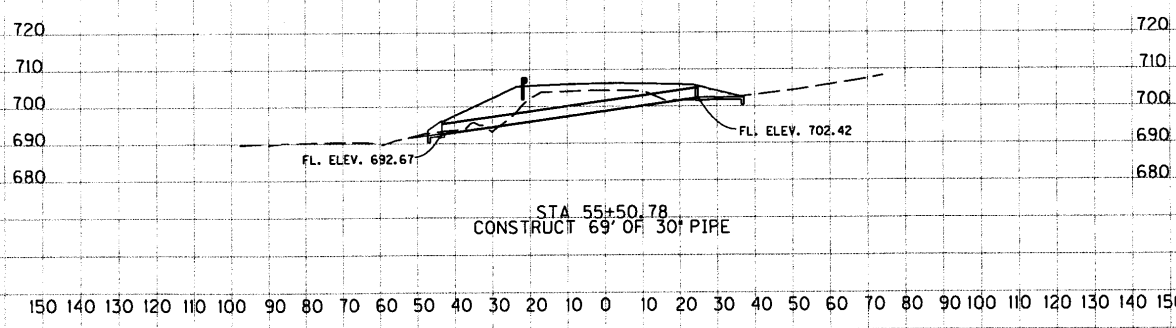
PLAN SHEET 15

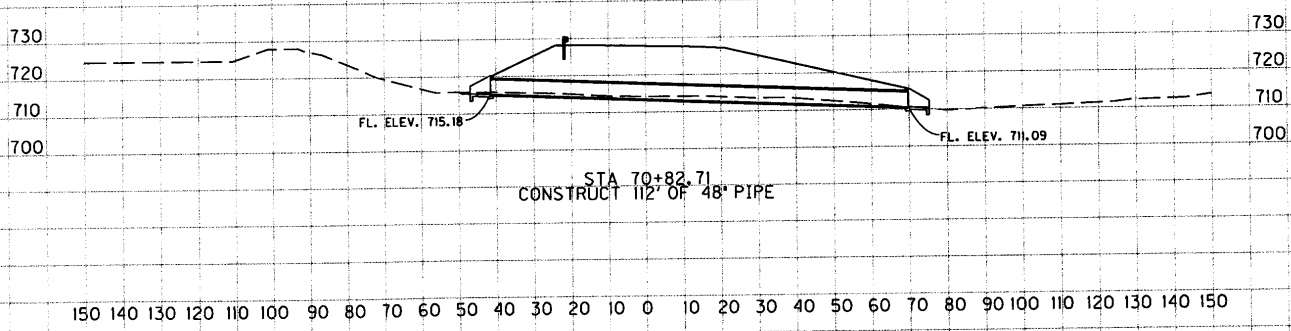


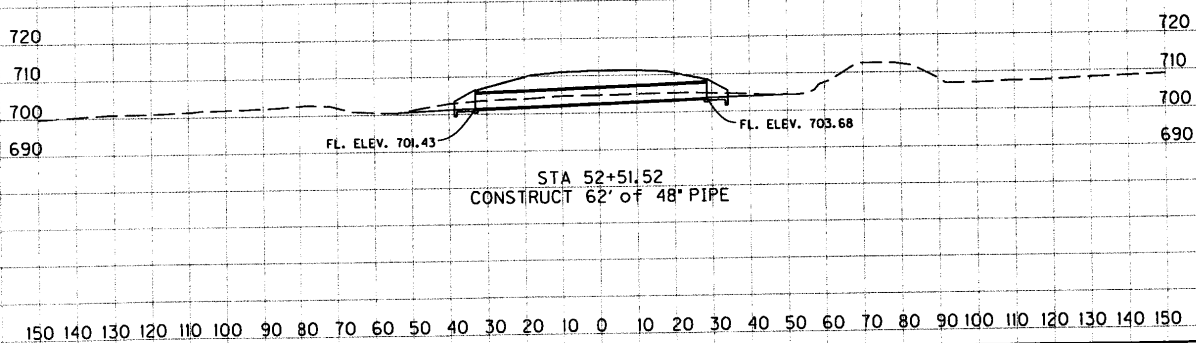


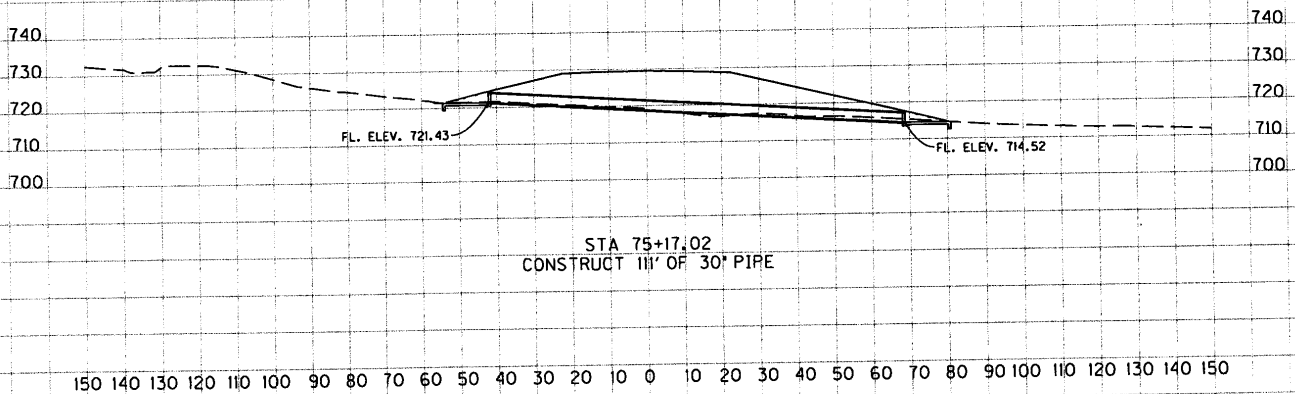


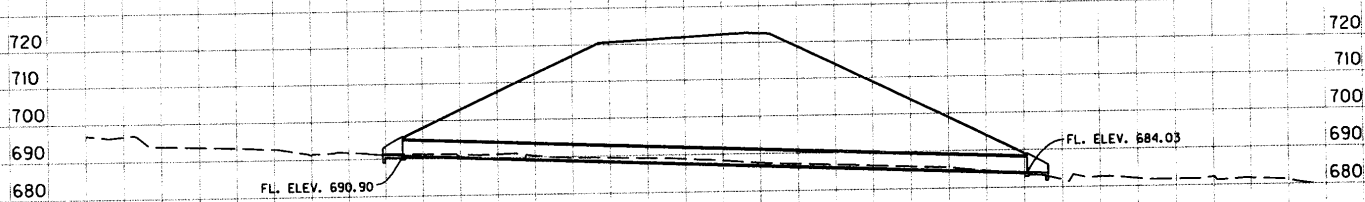




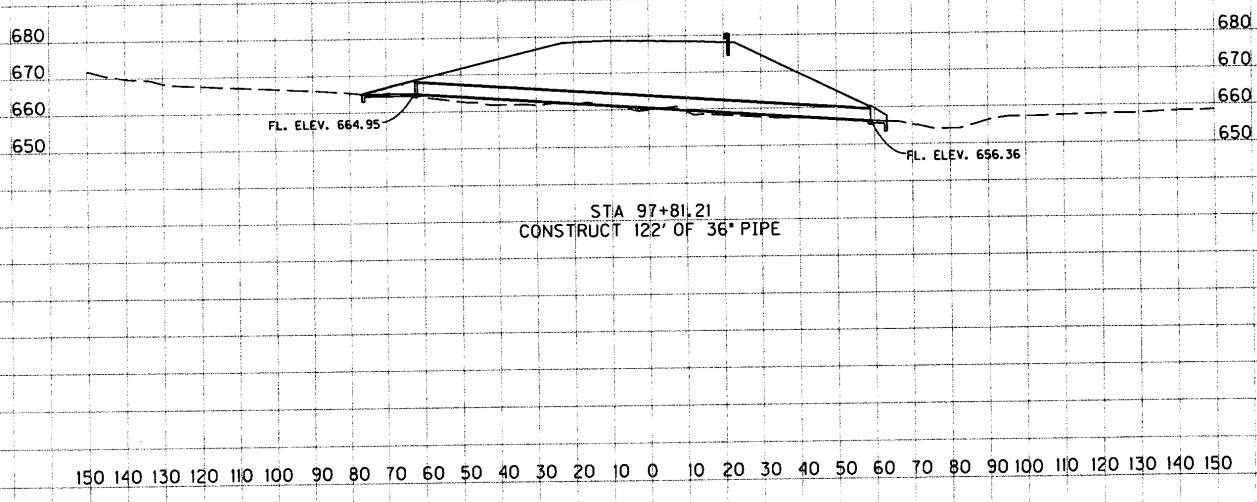


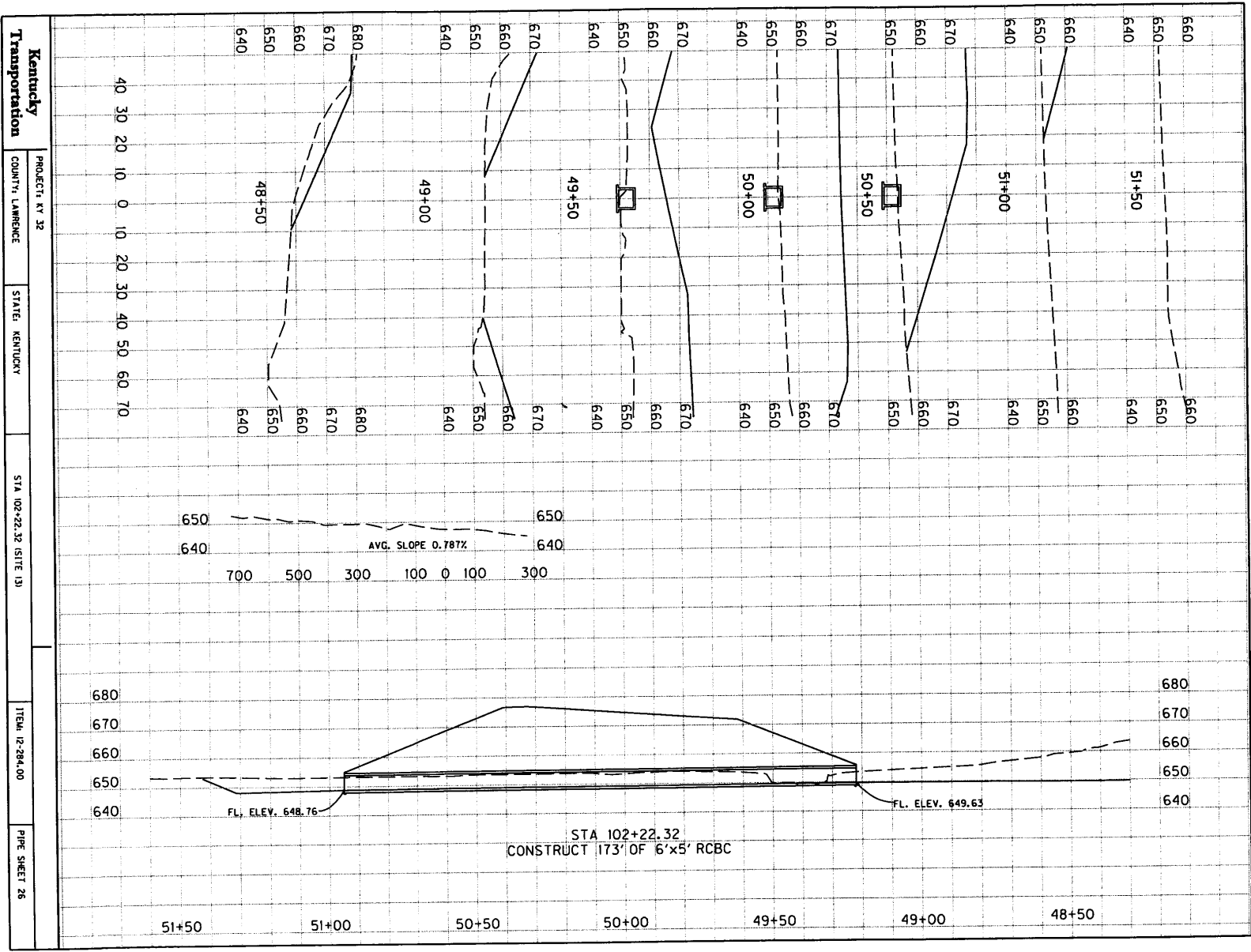


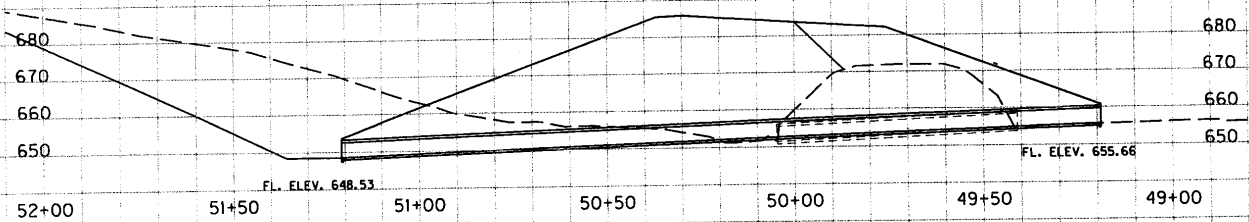
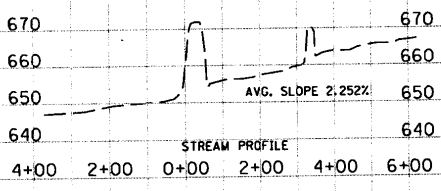
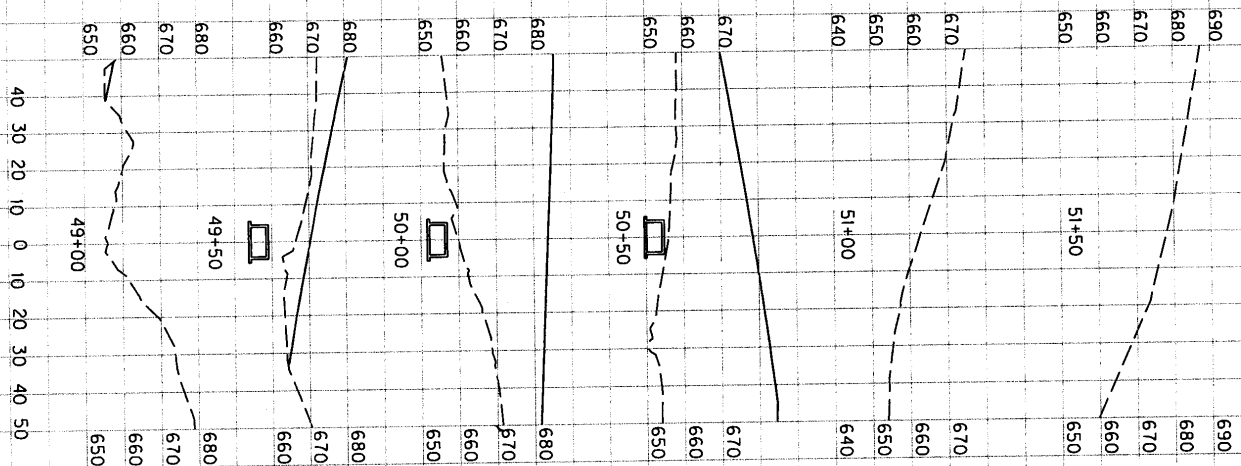




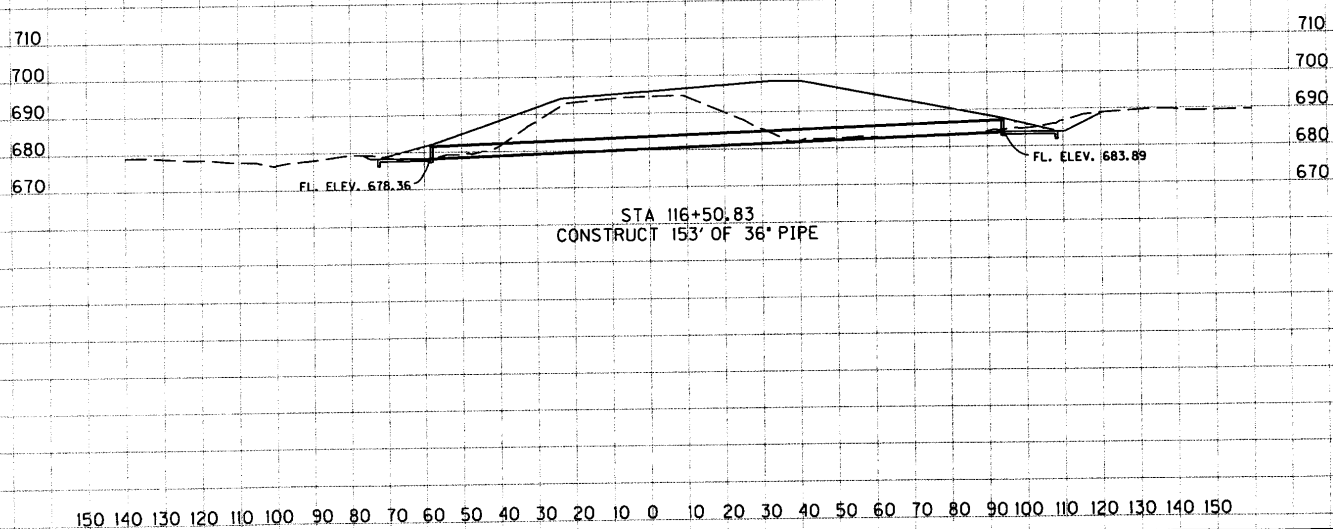
STA 86+99.76  
CONSTRUCT 167' OF 48" PIPE

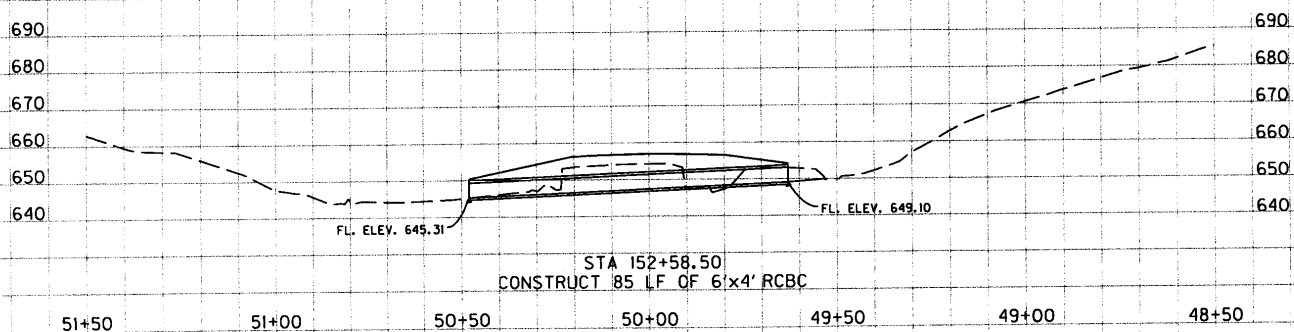
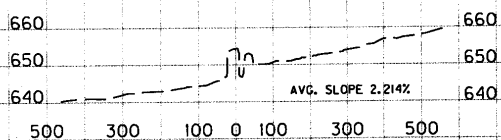
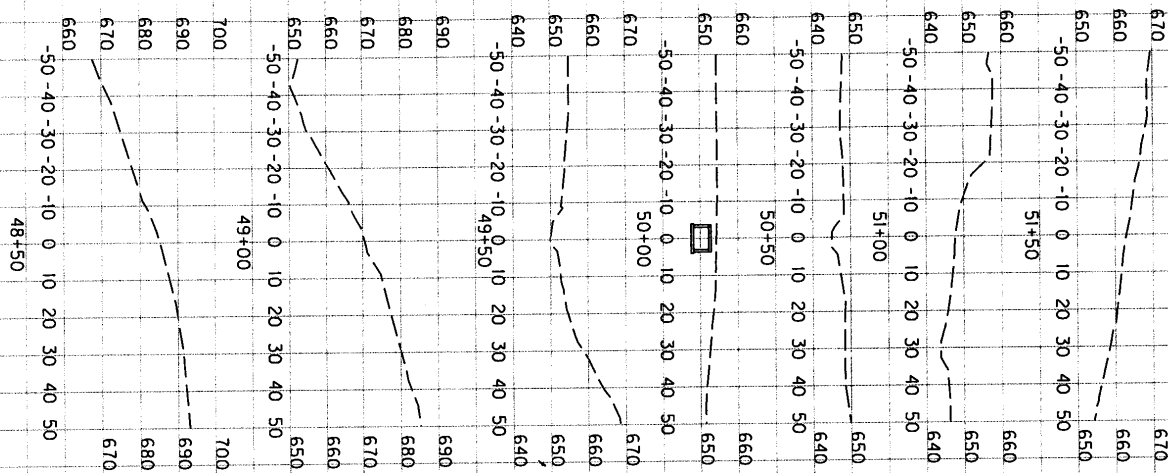




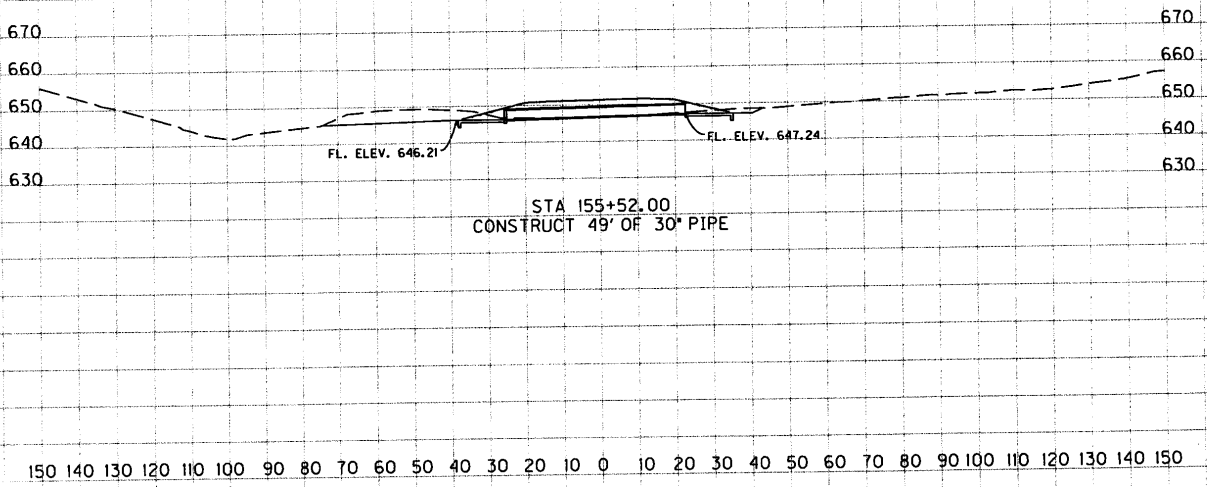


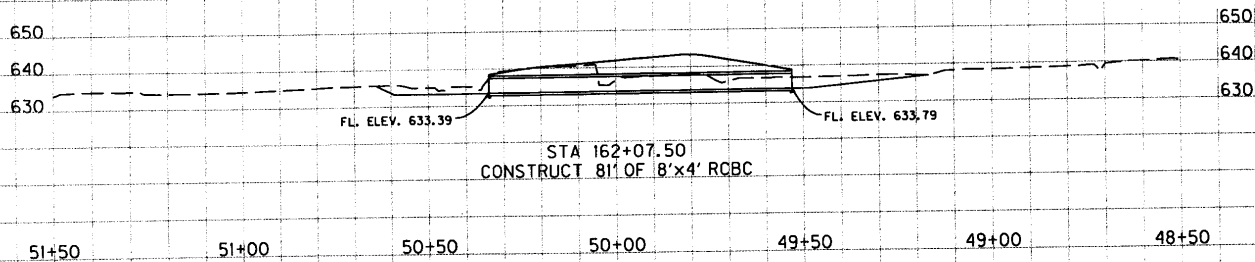
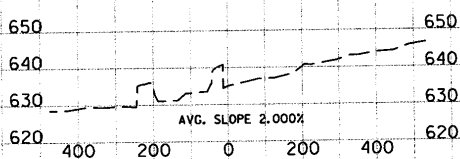
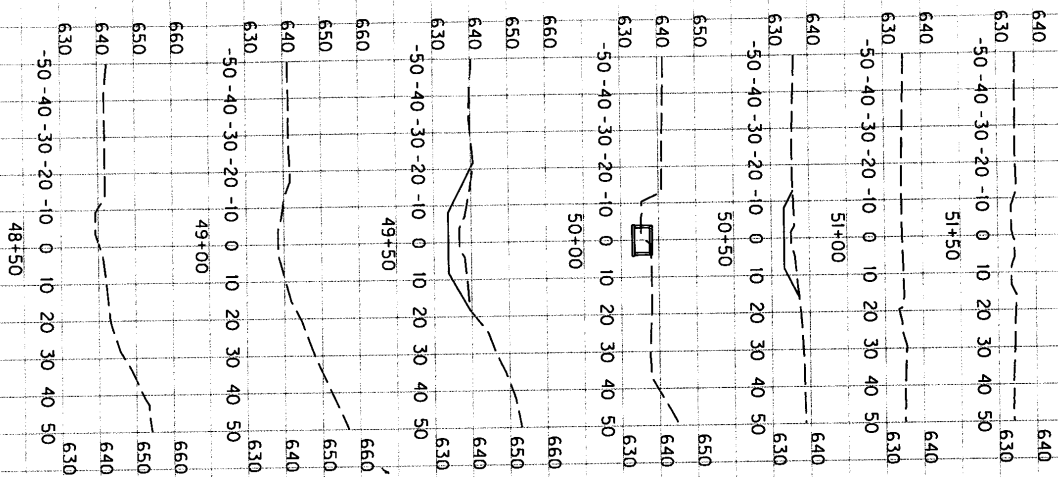
STA 107+29.55  
CONSTRUCT 202' OF 8'X4' RCBC

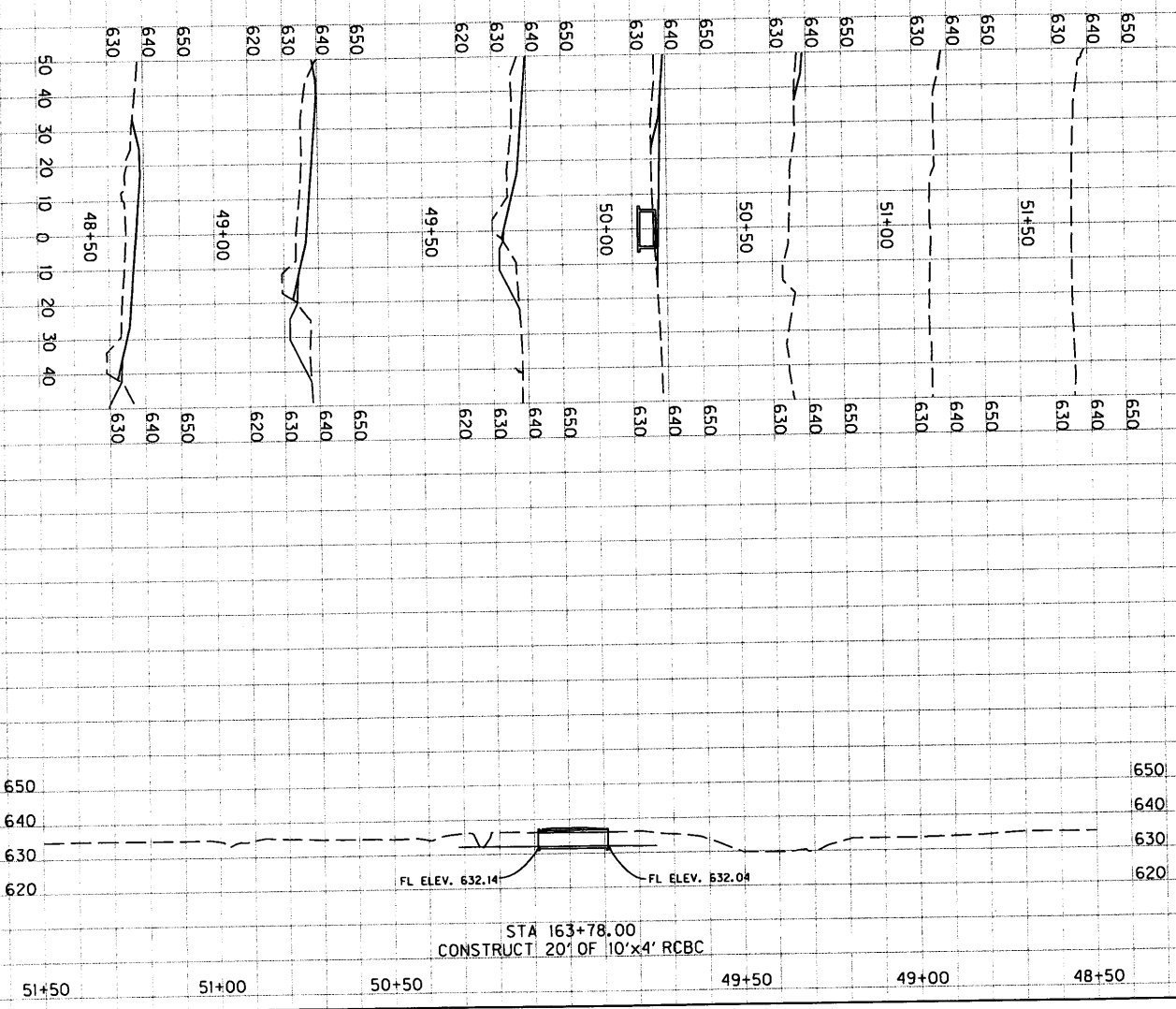




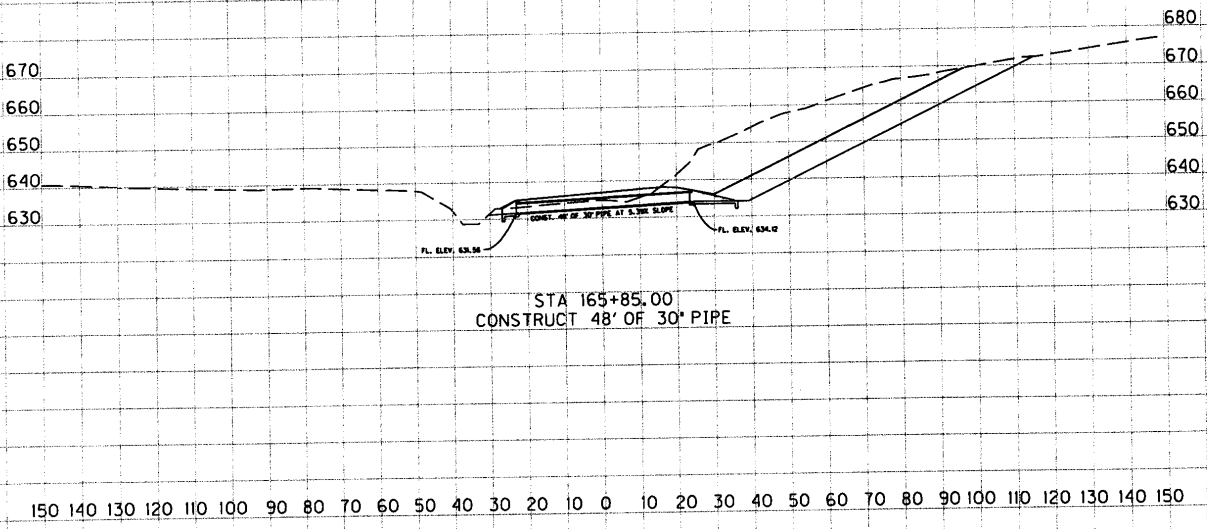
Kentucky  
PROJECT: KY 32  
STATE: KENTUCKY  
STA: 155+52.00 (SITE 19)  
ITEM: 12-284.00  
PIPE SHEET 30

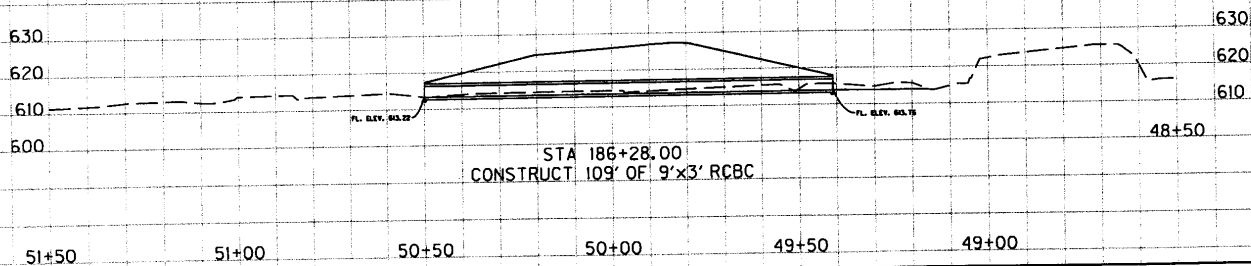
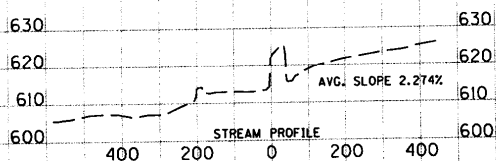
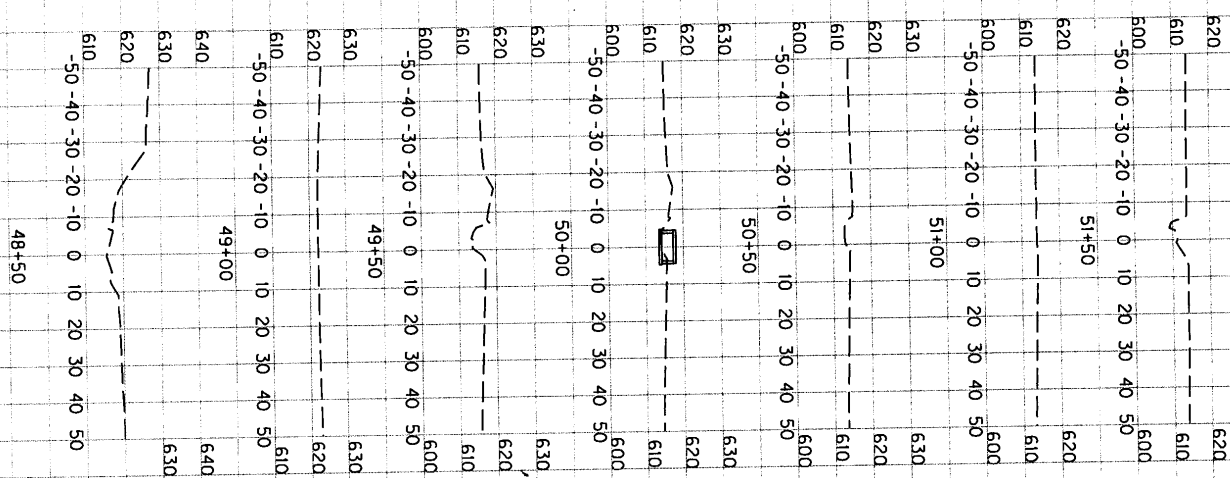


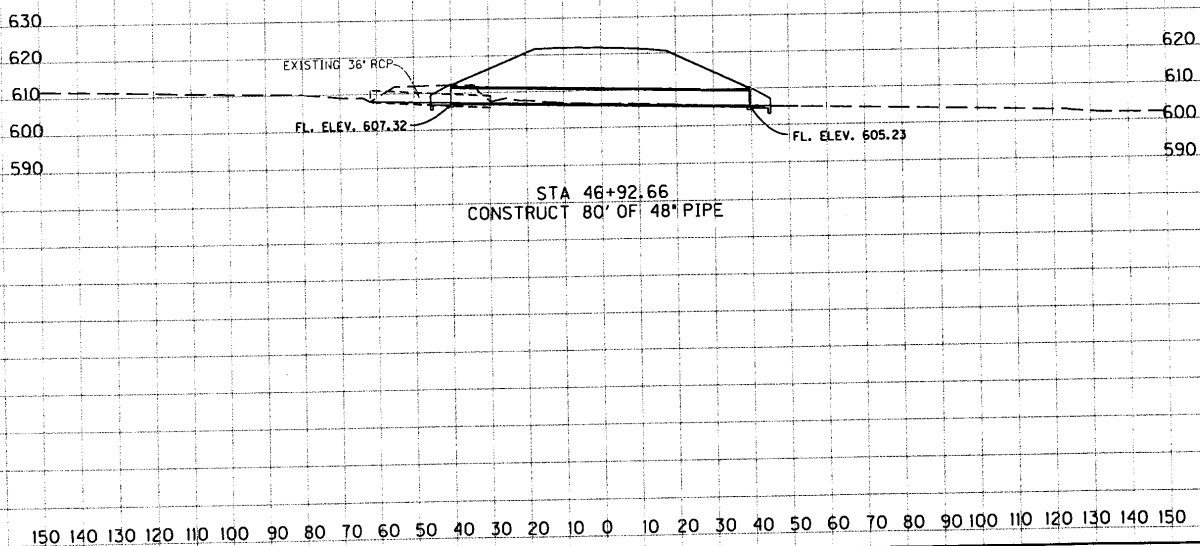


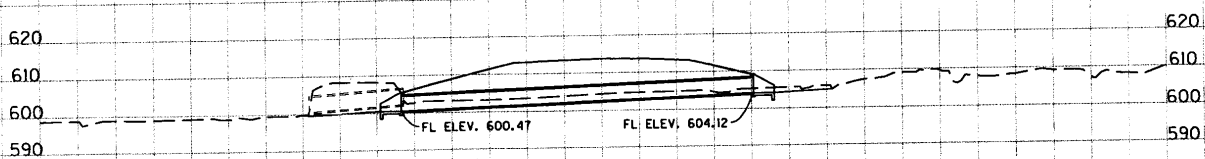


Kentucky  
PROJECT: KY 32  
COUNTY: LARSEN  
STATE: KENTUCKY  
STA 165+85.00 (SITE 22)  
ITEM: 12-284.00  
PIPE SHEET 33

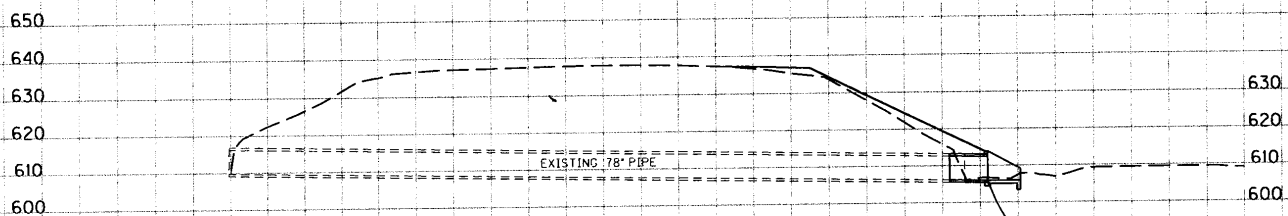








STA 49+15.41  
CONSTRUCT 94' OF 48" PIPE



STA 1273+20.00  
CONSTRUCT 11\"/>

FL ELEV. 605.95

# High Gradient Stream Data Sheet

|   |  |  |  |  |  |
|---|--|--|--|--|--|
| STREAM NAME: <i>PER-1 US</i>  |  |  | LOCATION: <i>Ass#27</i>  |  |  |
| STATION:  |  | DRAINAGE AREA (AC)   | BASIN/WATERSHED <i>Big Sandy River</i>   |  |  |
| LAT: <i>38-04-09.2</i>  |  | LONG: <i>82-40-06.2</i>  | COUNTY; <i>Lawrence</i> USGS 7.5 TOPO;   |  |  |
| DATE: <i>2-24-09</i>  |  | TIME: <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM   | INVESTIGATORS; <i>Rob Lewis, Julie Clark</i>   |  |  |
| TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.  |  |  |  |  |  |
| WEATHER:      Now      Past 24 hours      Has there been a heavy rain in the last 7 days?<br><input type="checkbox"/> <input type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br><input type="checkbox"/> <input type="checkbox"/> Steady rain      Air temperature <i>35</i> °F.      Inches rainfall in past 24 hours <i>   </i> in<br><input type="checkbox"/> <input type="checkbox"/> Intermittent showers <i>0</i> % Cloud Cover<br><input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Clear/sunny |  |  |  |  |  |
| P-Chem:      Temp (°F) <i>39.4</i> D.O. (mg/l) <i>   </i> % Saturation <i>   </i> pH(S.U.) <i>   </i> Cond.µs <i>186</i> <input type="checkbox"/> Grab  |  |  |  |  |  |
| <b>INSTREAM WATERSHED FEATURES</b><br>Stream Width EOW <i>4</i> ft<br>Stream Width BF <i>9</i> ft<br>Range of Depth <i>0.1-1.0</i> ft<br>Bankfull Depth <i>1.7</i> ft<br>Est. Reach Length <i>   </i> ft  |  |  | <b>LOCAL WATERSHED FEATURES:</b><br>Predominant Surrounding Land Use:<br><input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest<br><input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing<br><input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture<br><input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers |  |  |
| Hydraulic Structures:<br><input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal<br><input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential<br><input type="checkbox"/> Other <input type="checkbox"/> Culverts  |  |  | Stream Flow;      Stream Type;<br><input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent<br><input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep  |  |  |
| Riparian Vegetation:<br>Dominate Type:<br><input type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs<br><input checked="" type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous<br>Number of Strata <i>3</i>  |  | Dom. Tree/Shrub Taxa<br><i>Black willow</i><br><i>Rubus species</i>  |  | Canopy Cover;<br><input checked="" type="checkbox"/> Fully Exposed (0-25%)<br><input type="checkbox"/> Partially Exposed (25-50%)<br><input type="checkbox"/> Partially Shaded (50-75%)<br><input type="checkbox"/> Fully Shaded (75-100%) |  |
| Channel Alterations;<br><input type="checkbox"/> Dredging<br><input checked="" type="checkbox"/> Channelization<br>( <input checked="" type="checkbox"/> Full <input type="checkbox"/> Partial)   |  |  |  |  |  |
| Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.      Riffle <i>20</i> %      Run; <i>10</i> %      Pool <i>70</i> %  |  |  |  |  |  |
| Silt/Clay (<0.06 mm)  |  | <i>15</i>  |  | <i>15</i>  |  |
| Sand (0.06-2 mm)  |  | <i>15</i>  |  | <i>30</i>  |  |
| Gravel (2-64 mm)  |  | <i>50</i>  |  | <i>25</i>  |  |
| Cobble (64-256 mm)  |  | <i>15</i>  |  | <i>10</i>  |  |
| Boulders (>256 mm)  |  | <i>5</i>   |  | <i>5</i>   |  |
| Bedrock   |  |  |  |  |  |
| <b>Condition Category</b>   |  |  |  |  |  |
| <b>Habitat</b>  |  |  |  |  |  |
| <b>Parameter</b>  | <b>Optimal</b>   | <b>Suboptimal</b>  | <b>Marginal</b>  | <b>Poor</b>  |  |
| 1. Epifaunal Substrate/ Available Cover   | Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient. | 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale). | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.   | Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.   |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>   |  |
| 2. Embeddedness   | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.   | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.   |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>   |  |
| 3. Velocity/Depth Regime  | All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.  | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)  | Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)   | Dominated by 1 velocity/depth regime.  |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>   |  |

|   |  |  |   |   |
|---|--|--|---|---|
| 4. Sediment Deposition  | Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.  | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.   | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.                          |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 5. Channel Flow Status  | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.  | Water fills > 75% of the available channel; or <25% of channel substrate is exposed.   | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.   | Very little water in channel and mostly present as standing pools.  |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 6. Channel Alteration   | Channelization or dredging absent or minimal; stream with normal pattern.  | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.   | Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.   | Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.   |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 7. Frequency of Riffles   | Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.   | Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.   | Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.  | Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.   |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 8. Bank Stability   | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.   | Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.   | Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.  | Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.   |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| 9. Vegetative Protection (score each bank)                          | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.       | Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| 10. Riparian Vegetative Zone Width (score each bank riparian zone). | Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone  | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.   | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.   | Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.   |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |

Total Score

83

NOTES/COMMENTS;









# High Gradient Stream Data Sheet

|   |  |  |  |   |  |
|---|--|--|--|---|--|
| STREAM NAME: <i>PER-1 DS</i>  |  |  | LOCATION: <i>Ass#26</i>  |   |  |
| STATION:  |  | DRAINAGE AREA (AC)   | BASIN/WATERSHED <i>Big Sandy River</i>   |   |  |
| LAT: <i>38-04-08.6</i>  |  | LONG: <i>82-40-08.6</i>  | COUNTY: <i>Lawrence</i> USGS 7.5 TOPO;   |   |  |
| DATE: <i>2-24-09</i>  |  | TIME: <input type="checkbox"/> AM <input checked="" type="checkbox"/> PM   | INVESTIGATORS: <i>Rob Lewis, Julie Clark</i>   |   |  |
| TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.  |  |  |  |   |  |
| WEATHER:  |  | Has there been a heavy rain in the last 7 days?  |  |   |  |
| Now <input type="checkbox"/><br><input type="checkbox"/><br><input type="checkbox"/><br><input checked="" type="checkbox"/>   |  | Past 24 hours<br><input type="checkbox"/> Heavy rain<br><input type="checkbox"/> Steady rain<br><input type="checkbox"/> Intermittent showers<br><input checked="" type="checkbox"/> Clear/sunny   |  |   |  |
|   |  | Air temperature <i>39</i> °F.      Inches rainfall in past 24 hours <i>    </i> in<br><i>0</i> % Cloud Cover   |  |   |  |
| P-Chem:      Temp (°F) <i>40</i> D.O. (mg/l) <i>    </i> % Saturation <i>    </i> pH(S.U.) <i>    </i> Cond.µs <i>196</i> <input type="checkbox"/> Grab   |  |  |  |   |  |
| <b>INSTREAM WATERSHED FEATURES</b><br>Stream Width EOW <i>8</i> ft<br>Stream Width BF <i>12</i> ft<br>Range of Depth <i>0.1-1.5</i> ft<br>Bankfull Depth <i>1.5</i> ft<br>Est. Reach Length <i>    </i> ft                                  |  |  | <b>LOCAL WATERSHED FEATURES:</b><br>Predominant Surrounding Land Use:<br><input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest<br><input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing<br><input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture<br><input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers |   |  |
| Hydraulic Structures:<br><input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments<br><input type="checkbox"/> Island <input type="checkbox"/> Waterfalls<br><input type="checkbox"/> Other <input type="checkbox"/> Culverts |  |  | Stream Flow;<br><input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input checked="" type="checkbox"/> Normal<br><input type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential  |   |  |
| Riparian Vegetation:<br>Dominate Type:<br><input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs<br><input checked="" type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous<br>Number of Strata <i>2</i>         |  |  | Channel Alterations;<br><input type="checkbox"/> Dredging<br><input checked="" type="checkbox"/> Channelization<br><input checked="" type="checkbox"/> Full <input type="checkbox"/> Partial   |   |  |
| Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.  |  |  | Stream Type;<br><input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent<br><input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep  |   |  |
| Riffle <i>30</i> %  |  |  | Run; <i>10</i> %   |   |  |
| Pool <i>60</i> %  |  |  |  |   |  |
| Silt/Clay (<0.06 mm) <i>5</i>   |  |  | <i>5</i>   |   |  |
| Sand (0.06-2 mm) <i>5</i>   |  |  | <i>5</i>   |   |  |
| Gravel (2-64 mm) <i>70</i>  |  |  | <i>60</i>  |   |  |
| Cobble (64-256 mm) <i>20</i>  |  |  | <i>25</i>  |   |  |
| Boulders (>256 mm) <i>    </i>  |  |  | <i>5</i>   |   |  |
| Bedrock <i>    </i>   |  |  | <i>10</i>  |   |  |
| <b>Condition Category</b>   |  |  |  |   |  |
| <b>Habitat</b>  | <b>Optimal</b>   | <b>Suboptimal</b>  | <b>Marginal</b>  | <b>Poor</b>   |  |
| <b>Parameter</b>  |  |  |  |   |  |
| 1. Epifaunal Substrate/ Available Cover   | Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient. | 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale). | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.   | Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking. |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>  |  |
| 2. Embeddedness   | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.   | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.      |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>  |  |
| 3. Velocity/Depth Regime  | All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.  | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)  | Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)   | Dominated by 1 velocity/depth regime.   |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>  |  |

|   |  |  |   |   |
|---|--|--|---|---|
| 4. Sediment Deposition  | Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.  | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.   | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.                          |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 5. Channel Flow Status  | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.  | Water fills > 75% of the available channel; or <25% of channel substrate is exposed.   | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.   | Very little water in channel and mostly present as standing pools.  |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 6. Channel Alteration   | Channelization or dredging absent or minimal; stream with normal pattern.  | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.   | Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.   | Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.   |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 7. Frequency of Riffles   | Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.   | Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.   | Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.  | Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.   |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 8. Bank Stability   | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.   | Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.   | Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.  | Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.   |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| 9. Vegetative Protection (score each bank)                          | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.       | Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| 10. Riparian Vegetative Zone Width (score each bank riparian zone). | Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone  | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.   | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.   | Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.   |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |

Total Score

126

NOTES/COMMENTS;







# High Gradient Stream Data Sheet

|   |  |   |  |  |  |
|---|--|---|--|--|--|
| STREAM NAME: <i>PER-2 US</i>  |  |   | LOCATION: <i>Ass#21</i>  |  |  |
| STATION:  |  | DRAINAGE AREA (AC)  | BASIN/WATERSHED <i>Big Sandy River</i>   |  |  |
| LAT: <i>38-05-06.1</i>  |  | LONG: <i>82-39-19</i>   | COUNTY: <i>Lawrence</i> USGS 7.5 TOPO;   |  |  |
| DATE: <i>2-12-09</i>  |  | TIME: <i>   </i> : <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM   | INVESTIGATORS: <i>Rob Lewis, Rick Heil</i>   |  |  |
| TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.  |  |   |  |  |  |
| WEATHER:      Now      Past 24 hours      Has there been a heavy rain in the last 7 days?<br><input type="checkbox"/> <input checked="" type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br><input type="checkbox"/> <input type="checkbox"/> Steady rain      Air temperature <i>38</i> °F.      Inches rainfall in past 24 hours <i>   </i> in<br><input type="checkbox"/> <input type="checkbox"/> Intermittent showers <i>20</i> % Cloud Cover<br><input checked="" type="checkbox"/> Clear/sunny <input type="checkbox"/> Clear/sunny  |  |   |  |  |  |
| P-Chem:      Temp (°F) <i>44</i> D.O. (mg/l) <i>   </i> % Saturation <i>   </i> pH(S.U.) <i>   </i> Cond.µs <i>261</i> <input type="checkbox"/> Grab  |  |   |  |  |  |
| <b>INSTREAM WATERSHED FEATURES</b><br>Stream Width EOW <i>5</i> ft<br>Stream Width BF <i>9</i> ft<br>Range of Depth <i>0.1-1.0</i> ft<br>Bankfull Depth <i>1.25</i> ft<br>Est. Reach Length <i>   </i> ft   |  |   | <b>LOCAL WATERSHED FEATURES:</b><br>Predominant Surrounding Land Use:<br><input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest<br><input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing<br><input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture<br><input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers |  |  |
| Hydraulic Structures:      Stream Flow;      Stream Type;<br><input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent<br><input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input checked="" type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential <input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep<br><input type="checkbox"/> Other <input type="checkbox"/> Culverts |  |   |  |  |  |
| Riparian Vegetation:<br>Dominate Type:<br><input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs <i>Poplar</i><br><input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous <i>Sycamore</i><br>Number of Strata <i>2</i>   |  | Dom. Tree/Shrub Taxa<br><i>Poplar</i><br><i>Sycamore</i>  |  | Canopy Cover;<br><input type="checkbox"/> Fully Exposed (0-25%)<br><input type="checkbox"/> Partially Exposed (25-50%)<br><input type="checkbox"/> Partially Shaded (50-75%)<br><input checked="" type="checkbox"/> Fully Shaded (75-100%) |  |
| Channel Alterations;<br><input type="checkbox"/> Dredging<br><input type="checkbox"/> Channelization<br>( <input type="checkbox"/> Full <input type="checkbox"/> Partial)   |  |   |  |  |  |
| Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C      Riffle <i>33</i> %      Run; <i>33</i> %      Pool <i>34</i> %   |  |   |  |  |  |
| Silt/Clay (<0.06 mm)  |  | <i>10</i>   |  | <i>20</i>  |  |
| Sand (0.06-2 mm)  |  | <i>20</i>   |  | <i>30</i>  |  |
| Gravel (2-64 mm)  |  | <i>40</i>   |  | <i>40</i>  |  |
| Cobble (64-256 mm)  |  | <i>30</i>   |  | <i>10</i>  |  |
| Boulders (>256 mm)  |  |   |  |  |  |
| Bedrock   |  |   |  |  |  |
| <b>Habitat</b>  |  | <b>Condition Category</b>   |  |  |  |
| <b>Parameter</b>  | <b>Optimal</b>   | <b>Suboptimal</b>   | <b>Marginal</b>  | <b>Poor</b>  |  |
| 1. Epifaunal Substrate/ Available Cover   | Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient. | 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale) | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.   | Less than 20% stable habitat" lack of habitat is obvious; substrate unstable or lacking.   |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>   | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>   |  |
| 2. Embeddedness   | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.   | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.   | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.   |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>   | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>   |  |
| 3. Velocity/Depth Regime  | All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet.  | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)   | Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)   | Dominated by 1 velocity/depth regime.  |  |
| <b>SCORE</b>  | <b>20 19 18 17 16</b>  | <b>15 14 13 12 11</b>   | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>   |  |

|   |  |  |   |   |
|---|--|--|---|---|
| 4. Sediment Deposition  | Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.  | Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.   | Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent. | Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.                          |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 5. Channel Flow Status  | Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.  | Water fills > 75% of the available channel; or <25% of channel substrate is exposed.   | Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.   | Very little water in channel and mostly present as standing pools.  |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 6. Channel Alteration   | Channelization or dredging absent or minimal; stream with normal pattern.  | Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr.) may be present, but recent channelization is not present.   | Channelization may be extensive; embankments or shoring structures present on both banks; and 40-80% of stream reach channelized and disrupted.   | Banks shored with gabion of cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.   |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 7. Frequency of Riffles   | Occurrence of riffles relatively frequent; spacing between riffles 5 to 7 stream widths. Variety of habitat is key. In streams where riffles are continuous, boulders or logs are important.   | Occurrence of riffles infrequent; distance between riffles divided by stream width is between 7 to 15.   | Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by stream width is between 15 to 25.  | Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by stream width is > than 25.   |
| SCORE   | 20 19 18 17 16   | 15 14 13 12 11   | 10 9 8 7 6  | 5 4 3 2 1 0   |
| 8. Bank Stability   | Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.   | Moderately stable, infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.   | Moderately unstable, 30-60% of bank in reach has areas of erosion, high erosion potential during floods.  | Unstable, many eroded areas, "raw" areas frequently along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.   |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| 9. Vegetative Protection (score each bank)                          | More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally. | 70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining. | 50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.       | Less than 50% of the streambank surfaces covered by vegetation; disruptive of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height. |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |
| 10. Riparian Vegetative Zone Width (score each bank riparian zone). | Width of riparian zone > 18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone  | Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.   | Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.   | Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.   |
| SCORE (LB)  | Left Bank 10 9   | 8 7 6  | 5 4 3   | 2 1 0   |
| SCORE (RB)  | Right Bank 10 9  | 8 7 6  | 5 4 3   | 2 1 0   |

Total Score

136

NOTES/COMMENTS;







# High Gradient Stream Data Sheet

|  |  |   |  |  |   |
|--|--|---|--|--|---|
| STREAM NAME: <i>PER-2 DS</i>   |  |   | LOCATION: <i>Ass#20</i>  |  |   |
| STATION:   |  | DRAINAGE AREA (AC)  | BASIN/WATERSHED <i>Big Sandy River</i>   |  |   |
| LAT: <i>38-05-10</i>   |  | LONG: <i>82-39-18.5</i>   | COUNTY: <i>Lawrence</i> USGS 7.5 TOPO;   |  |   |
| DATE: <i>2-12-09</i>   |  | TIME: <input checked="" type="checkbox"/> AM <input type="checkbox"/> PM    | INVESTIGATORS: <i>Rob Lewis, Rick Heil</i>   |  |   |
| TYPE SAMPLE: <input type="checkbox"/> P-CHEM <input type="checkbox"/> Macroinvertebrate <input type="checkbox"/> FISH <input type="checkbox"/> BACT.   |  |   |  |  |   |
| WEATHER: Now <input type="checkbox"/> Past 24 hours <input checked="" type="checkbox"/> Heavy rain <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No<br><input type="checkbox"/> Steady rain Air temperature <i>35</i> °F. Inches rainfall in past 24 hours <i>    </i> in<br><input type="checkbox"/> Intermittent showers <i>35</i> % Cloud Cover<br><input checked="" type="checkbox"/> Clear/sunny   |  |   |  |  |   |
| P-Chem: Temp (°F) <i>43.4</i> D.O. (mg/l) <i>    </i> % Saturation <i>    </i> pH(S.U.) <i>    </i> Cond.µs <i>253</i> <input type="checkbox"/> Grab   |  |   |  |  |   |
| <b>INSTREAM WATERSHED FEATURES</b><br>Stream Width EOW <i>7</i> ft<br>Stream Width BF <i>15</i> ft<br>Range of Depth <i>0.1-2.0</i> ft<br>Bankfull Depth <i>1.75</i> ft<br>Est. Reach Length <i>    </i> ft  |  |   | <b>LOCAL WATERSHED FEATURES:</b><br>Predominant Surrounding Land Use:<br><input type="checkbox"/> Surface Mining <input type="checkbox"/> Construction <input checked="" type="checkbox"/> Forest<br><input type="checkbox"/> Deep Mining <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture/Grazing<br><input type="checkbox"/> Oil Wells <input type="checkbox"/> Industrial <input type="checkbox"/> Silviculture<br><input type="checkbox"/> Land Disposal <input type="checkbox"/> Row Crops <input type="checkbox"/> Urban Runoff/Storm Sewers |  |   |
| Hydraulic Structures:<br><input type="checkbox"/> Dams <input type="checkbox"/> Bridge Abutments <input type="checkbox"/> Dry <input type="checkbox"/> Pooled <input type="checkbox"/> Low <input type="checkbox"/> Normal<br><input type="checkbox"/> Island <input type="checkbox"/> Waterfalls <input checked="" type="checkbox"/> High <input type="checkbox"/> Very Rapid or Torrential<br><input type="checkbox"/> Other <input type="checkbox"/> Culverts |  |   | Stream Flow;<br>Stream Type;<br><input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent<br><input type="checkbox"/> Ephemeral <input type="checkbox"/> Seep  |  |   |
| Riparian Vegetation:<br>Dominate Type:<br><input checked="" type="checkbox"/> Trees <input checked="" type="checkbox"/> Shrubs<br><input type="checkbox"/> Grasses <input checked="" type="checkbox"/> Herbaceous<br>Number of Strata <i>3</i>   |  | Dom. Tree/Shrub Taxa<br><i>Hornbeam</i><br><i>Poplar</i><br><i>Sycamore</i> |  | Canopy Cover;<br><input type="checkbox"/> Fully Exposed (0-25%)<br><input type="checkbox"/> Partially Exposed (25-50%)<br><input type="checkbox"/> Partially Shaded (50-75%)<br><input checked="" type="checkbox"/> Fully Shaded (75-100%) |   |
| Channel Alterations;<br><input type="checkbox"/> Dredging<br><input type="checkbox"/> Channelization<br>( <input type="checkbox"/> Full <input type="checkbox"/> Partial)  |  |   |  |  |   |
| Substrate <input checked="" type="checkbox"/> Est. <input type="checkbox"/> P.C.   |  | Riffle <i>40</i> %  |  | Run; <i>20</i> %   |   |
|  |  | Pool <i>40</i> %  |  |  |   |
| Silt/Clay (<0.06 mm)   |  | <i>10</i>   |  | <i>20</i>  |   |
| Sand (0.06-2 mm)   |  | <i>25</i>   |  | <i>30</i>  |   |
| Gravel (2-64 mm)   |  | <i>40</i>   |  | <i>40</i>  |   |
| Cobble (64-256 mm)   |  | <i>25</i>   |  | <i>10</i>  |   |
| Boulders (>256 mm)   |  |   |  |  |   |
| Bedrock  |  |   |  |  |   |
| <b>Condition Category</b>  |  |   |  |  |   |
| <b>Habitat</b>   | <b>Optimal</b>   |   | <b>Suboptimal</b>  | <b>Marginal</b>  | <b>Poor</b>   |
| <b>Parameter</b>   |  |   |  |  |   |
| 1. Epifaunal Substrate/ Available Cover  | Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient. |   | 40-70% mix of stable habitat; well suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of new fall, but not yet prepared for colonization (may rate at high end of scale).   | 20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.   | Less than 20-% stable habitat" lack of habitat is obvious; substrate unstable or lacking. |
| <b>SCORE</b>   | <b>20 19 18 17 16</b>  |   | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>  |
| 2. Embeddedness  | Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.   |   | Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.  | Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.      |
| <b>SCORE</b>   | <b>20 19 18 17 16</b>  |   | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>  |
| 3. Velocity/Depth Regime   | All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow. Deep > 1.5 feet)  |   | Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes)  | Only 2 of the 4 habitat regimes present (if fast-shallow or slow shallow are missing, score low)   | Dominated by 1 velocity/depth regime.   |
| <b>SCORE</b>   | <b>20 19 18 17 16</b>  |   | <b>15 14 13 12 11</b>  | <b>10 9 8 7 6</b>  | <b>5 4 3 2 1 0</b>  |